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Successful Methods

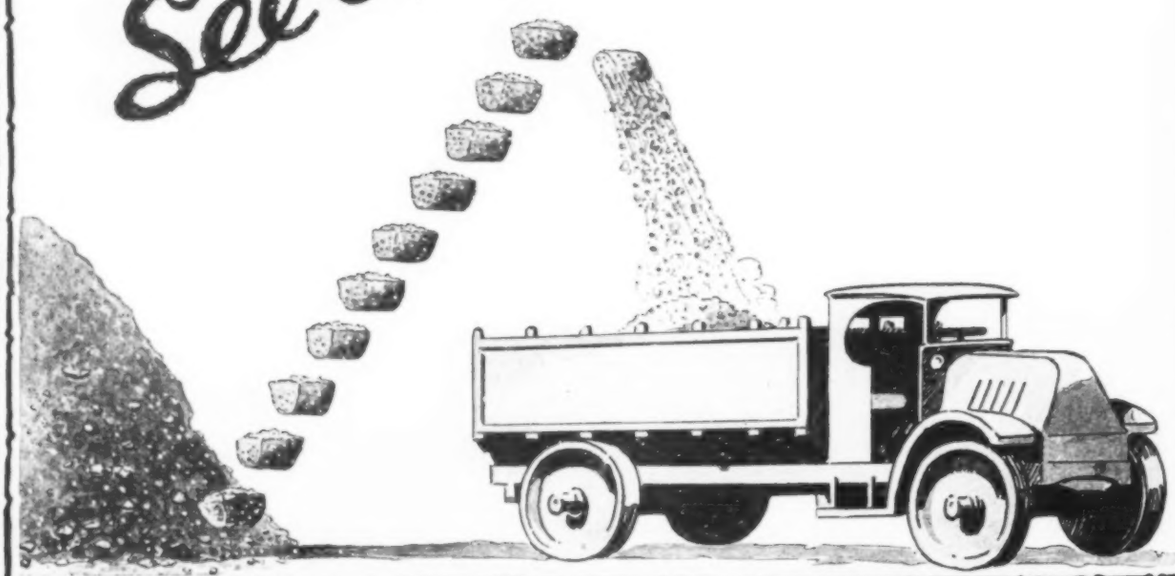
CONSTRUCTION - ROAD MAKING - ENGINEERING - INDUSTRIAL - MINING

VOL. 2 NOVEMBER 1920 No. 11

MODERN MAGIC ?

No!

See Pages 34 and 35



Successful Methods

A Magazine of Construction Service

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A TWELVE MONTH YEAR

Time was when the contractor hibernated during the winter months. But now, the insatiable demand for good roads, the transportation difficulties and the necessity for early placing of orders for equipment are all factors which make it advisable for the present day successful contractor to be most active the year 'round.

Some of the old timers remember when they could loaf or direct their endeavors to other fields during the winter months. But now, it is not profitable—in fact, modern progress does not permit the precious open season to be wasted in carrying on any phase of the work that can be done during the winter time.

Winter work of all kinds is becoming more a matter of course with each passing year. Several pages of this issue of Successful Methods are devoted to the work the states in the North are doing to keep their highways open to traffic during the snow season. That is a good indication of the trend of the times. There is so much to be done in the world that we cannot afford to waste time, even though Winter, which used to be a good excuse, is still with us.

It is work twelve months in the year now. Only by doing that can the world's greatest job of construction be accomplished.

This Magazine Will Be Sent to Men Who Can Use It.

EDITORIALS

Many Methods—No Standards

THERE is one thing that everyone is agreed on and that is that our highways, especially the through routes, should be kept open through the winter months. That is as far as the agreement goes, however. When it comes to the responsibility for keeping the roads clear and the methods to be employed in doing it, all semblance of uniformity disappears. Each state has its own way of tackling the problem, in most cases developed without reference to how the other states are doing it, and no state thus far seems to be fully satisfied with its solution.

There are so many elements entering into the problem of snow removal that it is impossible to lay down any hard and fast rules at the present time. The whole matter is still in the experimental stage. The various states, counties and municipalities are trying out various schemes. In an effort to help the cause along, SUCCESSFUL METHODS has obtained from the highway departments of most of the "snow states" statements of the methods of snow removal practiced last winter and plans for the winter that is just beginning. These are set forth in necessarily brief form in this issue.

The great increase in motor truck traffic on the county highways is making it almost a necessity to keep the roads open through the winter months. At present in a large number of states the state highway departments have no moneys available for snow removal, that work being left to the counties, towns and cities. Most of the state highway engineers, however, who have written to SUCCESSFUL METHODS seem to realize that the time must come when the states will have to undertake this work and are looking forward to appropriate legislation carrying with it sufficient funds for the task. Under present conditions, however, a much-traveled road between two important cities may be blocked by the failure of one small county to clear its roads. Under such circumstances the work of the counties on either side of the blocked section is thrown away and little real good is accomplished. It is a state of affairs such as this, which is all too frequent, that will be done away with when the state highway departments are empowered to remove snow from the through routes.

So far as the actual methods of removal are concerned, there is still considerable doubt as to their comparative efficiency. Plows pulled by tractors, plows pushed by tractors, plows pulled by horses, graders and scrapers of various sorts, and even hand labor are being used in different parts of the country. Methods which work well in one section fail in others because of the differences in depths of drifts and other such conditions.

SUCCESSFUL METHODS hopes that the statements which follow will help those interested in the problem of snow removal by showing them what their fellow workers in other parts of the country are doing.

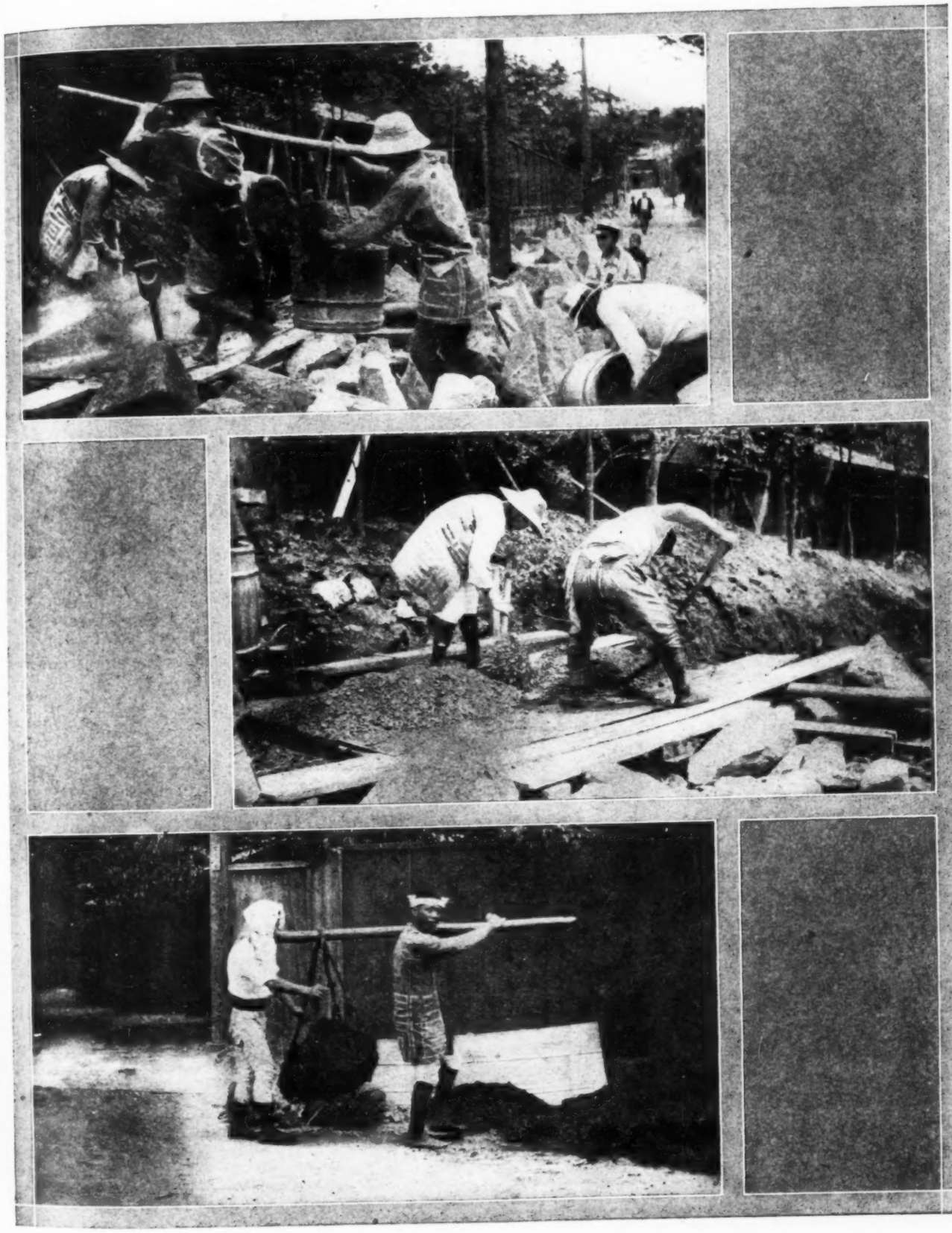
Successful Care of Small Tools

ON another page of this issue of SUCCESSFUL METHODS will be found an article signed E. C. E. It tells how a big money-making organization handles its small tool problem. The writer of the article is the efficiency engineer of the organization whose methods he describes. He knows what he is talking about.

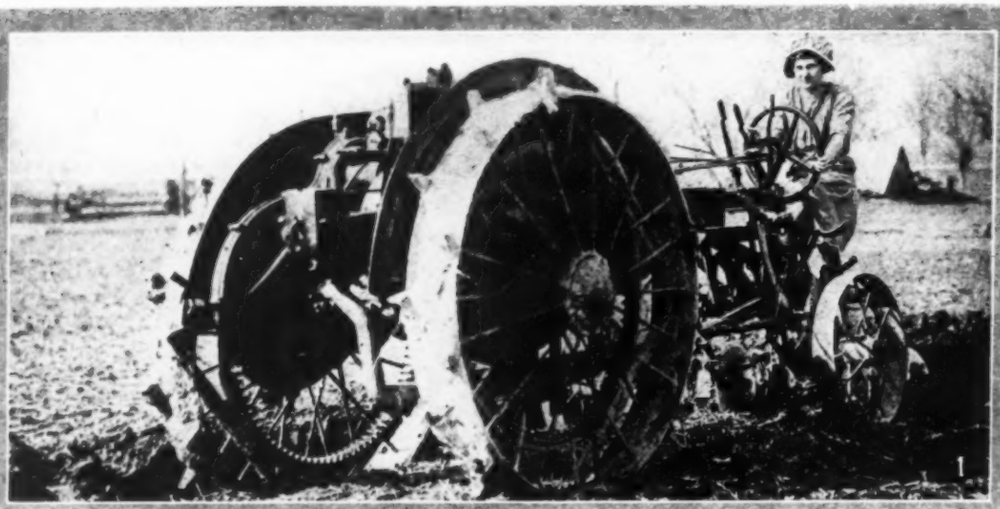
No matter how small a tool may be it ought to be made to yield the maximum of efficient service to its owner. It can do that only if it is properly cared for and kept in repair. Read what E. C. E. has to say and then decide whether or not your small tools such as shovels, hammers and picks are getting the care which they need. If not, don't expect too much of them.

Clearing a Pennsylvania Road with Shovels

HAND LABOR IN JAPAN



WHY THE WOMEN



1. Here in America they are showing their skill in handling massive machinery.

2. Over in Germany they build roads and take care of their children at the same time.

3. Before the Germans were conquered they chained women together and made them do the hard work in their African colonies.

4. The Russian women work in the salt fields without the aid of modern machinery.

DESERVE THE VOTE

5. A little women's suffrage would not be a bad thing in Algeria where women pull the plow.

6. Out in California women help build the roads, but their labor is reduced to a minimum by efficient machines.

7. Women till the soil in Germany. This photograph was taken in a sugar beet field.

PHOTOS © BY UNDERWOOD & UNDERWOOD

FIGHTING THE DRIFTS

What the Different States Are Doing to Eliminate the Word "Snowbound" From Our Vocabulary

Arizona

ARIZONA seems pretty far south to be classed as a snow state, but there is considerable territory in the mountainous sections where there is snowfall each winter. Thomas Maddock, state engineer, writes that last winter no actual snow removal was done by the department, although if necessary the state highways would be taken care of by the state department and the county roads left to the counties. Mr. Maddock adds:

"Our most successful methods of handling snow are: to elevate our grades through level country so that the snow blows off the road; to build our roads on the southern slope in hilly country, and to cut out the timber which would shade the road from the sunshine. These methods have kept our roads open with snow falls up to 2 ft. in depth, with but very few exceptions."

Colorado

NOT much snow removal was done in Colorado last winter, but the following letter from J. E. Maloney, chief engineer of the State Highway Commission, shows that the matter is not being neglected.

"Last April, when the spring snows were blowing from the top of the range, the Moffat Railroad was blocked for a week or more and in order to relieve the situation on the western slope, the Commission started an emergency crew to get supplies over to Grand County which is on the western slope. This crew working from the eastern end shoveled and packed down the trail to the top of the Divide meeting a similar outfit of horses and men working from the western slope. They did not clear the road, but packed a trail through so as to enable some supplies to be brought over. These were brought up from the foot of the pass with teams and carried to the other side of the Divide. This did not open the road to general travel and the cost was close to $1,000. This is the only work the Commission has done this year in attempting to remove the snow from the roads in the higher altitudes.

"In the neightborhood of Denver and Colorado Springs, immediately following the heavy snow storm of April 17th and 18th, the counties and state expended considerable energy in opening up their roads. The trails were broken first with horses working in pairs, followed by "V" shaped drags and men to shovel the larger drifts. The roads in the vicinity of the larger cities were all open within four or five days after the culmination of the storm."

Connecticut

C. J. BENNETT, State Highway Commissioner of Connecticut, writes that practically all snow removal work on highways outside of the cities was done by the State Highway Commission. He believes that the state should be in charge of snow removal work on all roads under its control. The method used was to push snowplows ahead of trucks wherever the snowfall was not excessive, and Mr. Bennett does not state what was done when excessive snowfall was encountered. He adds that in his opinion the concrete roads in Connecticut did not suffer from exposure to cold weather as a result of clearing them of snow.

Delaware

THERE were few snow storms in Delaware last winter and the State Highway Department had a fairly easy time of it. Small plows attached to Army motor trucks were used to clear the state highways. New Castle county kept its main roads open to automobile traffic through the winter and in some cases it was necessary to do considerable shoveling. Charles N. Upham, chief

A PAVED ROAD IN NEBRASKA AFTER THE SNOW HAD BEEN CLEARED

engineer, believes that the work of keeping the through highways open should be entrusted to the State Highway Department and that funds should be provided for this work. He also states that his department has not observed any damage done to the surface of concrete roads due to exposure to cold weather.

Illinois

THE great road program of Illinois is at present so far from completion that the problem of snow removal is greatly complicated. The following paragraph from a letter from Clifford Older, Chief Highway Engineer, explains the situation.

"The Illinois roads completed up to date over which the state has jurisdiction are so scattered that organization for snow removal would be of little effect so far as keeping open the main lines of travel. The state has no funds and no authority to maintain or remove snow from any road which has not been improved with state funds. Further, the state has no authority over local township highway commissioners. Therefore, it will be practically impossible for the state to attempt to keep main line travel open as such main lines involve only comparatively short stretches of roads over which the state has jurisdiction."

When the program is completed the difficulty mentioned by Mr. Older will be eliminated and Illinois then will be in a position to take up the work of snow removal during the winter months with the efficiency that it always has displayed.

Indiana

ALTHOUGH little snow removal work was done last winter by the Indiana Highway Commission, and therefore there are no experiences to report with the exception of a few jobs on the Lincoln Highway, the work will be carried on with vigor during the winter that is coming, as Indiana is one of those states which has recognized the importance of highway maintenance work and has established a separate division for the maintenance and repair of its state roads with A. H. Hinkle as chief engineer. This division will have charge of snow removal work.

Iowa

W. H. ROOT, engineer of maintenance, writes that the Iowa State Highway Commission is not satisfied with the result obtained last winter, when blade graders were used in snow removal work. The main fault of the graders was that they piled the snow up in ridges along the side of the road, thereby causing deeper drifts. During the summer and fall the Iowa commission conducted a prevention campaign. Previous experience had shown that the worst snow drifts were caused by the neglect to cut weeds and brush along the roadside and the object of the campaign was to remedy this neglect.

Michigan

A VALUABLE contribution to the snow removal problem is made by G. C. Dillman, maintenance engineer of the Michigan State Highway Department, who writes:

"The State Highway Department is directly interested only in snow removal on trunk line highways. We are maintaining about 5,500 miles of such road in this state. However, the mileage from which we will attempt this winter to keep the snow removed will amount to only a small fraction of the total. It is our plan to remove the snow only from the most important through routes.

"The snow removal problem in some of our northern counties, especially those bordering Lake Superior, is of considerable consequence. The traffic is light in winter and it does not warrant much of an expenditure for this purpose. The last winter a few 20-ton tractors were employed for this purpose with varying results. For this method of handling snow the equipment consisted of a tractor, a large snow plow and roller, and cost about $4.00 per mile to operate.

"A few of the snow plow attachments for trucks were tried out, and we found these fairly successful where the snow did not exceed 1 ft. in depth. Whenever we attempted to move the snow having a depth over 1 ft., there always was a tendency for the truck to go sideways, which was not productive of results.

"In some counties the ordinary road grader was used with good results where the snow fall was light. The common "A" type plow has been used quite extensively for this work. However, the width of road that can be cleared from snow by it is rather limited.

"We find that in the first place an organization must be perfected so that it is ready to start work the day the first fall of snow comes, as each fall of snow must be taken care of by itself. The snow should be moved entirely off the road grade and as far away from the edge of the road bed as possible.

"There are times when such equipment as has been used in this State is not adequate. Occasionally we have a heavy fall of snow and we often have to resort to hand shoveling methods to open up the road where drifts form."

Minnesota

IF there is any state in which there is ample opportunity to learn about snow removal it is Minnesota. For that reason the following statement written by W. F. Rosenwald, maintenance engineer of the Minnesota Highway Department, should prove extremely interesting to the readers of SUCCESSFUL METHODS:

"The rural Highways in Minnesota were blocked by snow drifts at various times and for various periods during the last winter. The average on more important roads was about four times and approximately five and six days each time, the last being the worst and extending over approximately two weeks. This caused considerable hardship to the rural communities by closing the roads to the markets and in case of accident or sickness making it very difficult to receive medical attention. The truck hauling was brought to a standstill at these times and the delivery of supplies such as cream and milk was materially affected.

"Due to the fact that our Constitution prohibits the state from engaging directly in road work the snow question has to be handled by the counties until our Constitution is amended which we hope will take place in the very near future. Most of our counties depend entirely upon local endeavor to keep the roads open, but a number of them handle this matter in a more systematic manner, and maintain a number of various types of snow plows on the more important roads, which were generally successful until the last storm. At the present time practically none of the counties is adequately prepared to keep any of the roads open under very severe conditions, but will be able to cope with conditions if the coming winter is a light one.

"A special effort is going to be made properly to equip and keep the road from Two Harbors to Grand Marais open at all times for the reason that there are no railroads in this portion of the state, and it is impossible to reach any portion of Cook County except by road.

"The experience during the last winter would indicate that up to the present time the most effective equipment for the average county is a "V" shaped snow plow with legs approximately 24 ft. long and spread about 16 ft., pulled by horses. Some very effective work was done in some of the counties by using a large snow plow pushed by trucks. A number of other counties used tractors, pulling large blade graders. However, it is evident that equipment for handling snow is still in the experimental stage, and it is the intention of this Department to carry on considerable experimental work this coming winter in order to determine the best mechanical means of handling snow.

CLEARING A ROAD WITH TRUCK AND BLADE MACHINE

"During the last few years considerable work has been done in the way of preventive measures, particularly in the design of new construction and the construction of snow fences which have proved very beneficial.

"It is very evident that snow removal on the main arterial roads of the state is a proper function of the State Highway Department for the same reason that the maintenance on these same roads should be handled by a state organization; the principal reason being the uniformity of methods and results which are possible under a centralized control, but which are seldom secured through control by smaller governmental units.

"During the last winter this Department made a survey of all serious snow drifts on our main roads. This will be done each winter hereafter and it is hoped that the information thus secured will prove of great value in planning preventive measures, as well as in planning removal. The information we secure in each case gives the apparent cause of the drift and the probable remedy. Experience indicates that it is not practical to open roads by hand shoveling, which is very expensive, and due to the fact that the snow is piled up along the roadside only makes the next storn leave a worse condition than before. With ordinary snow plows the same difficulty is met, but the market as yet has nothing to offer which gives much promise of solving the snow question, except one or two machines, which appear to be along the right principle, It would appear that some mechanical means of throwing the snow away from the road for a considerable distance must be developed."

Nebraska

THE Maintenance Division of the Bureau of Roads and Bridges of Nebraska was not organized until April 1st, 1920, so that the department did little snow removal last winter. Most of the counties of the state, however, had snow removal gangs working on the highways. Lancaster County in which Lincoln is situated, was one of the leaders in this work. The road maintenance work in Nebraska is being done by patrolmen and an excellent manual has been issued for their guidance. This manual takes up the question of snow removal and recommends the use of blade graders. The work of the new maintenance department during the coming winter undoubtedly will be of great interest.

Nevada

ALMOST unusual method of snow removal is described in the following excerpts from a letter written by C. C. Cottrell, State Highway Engineer of Nevada:

"The 'Kings Canyon' road is a stretch of the Lincoln Highway between Carson City and Lake Tahoe, a very remarkable scenic spot of the West. While this section is only 15 miles long it is of great importance from the tourist standpoint for it is a section of the tourist route into California and its early opening is looked forward to by everyone. This we were able to do with convicts and what we believe to be a unique method of snow removal.

"The road passes over a pass in the mountains having an elevation of about 7,500 ft. and the snow gets to be of exceptional depth, especially in the roadway which is 'side-hill cut.' The soil for almost the entire distance consists of a disintegrated granite making a heavy and coarse sand. This sand is sprinkled on top of the snow which is desired to be rid of, particularly that in the road itself. The sand passes down through the snow 'honeycombing' it, which in turn causes it to melt very rapidly. By this method a shear cut can be made in a bank several feet high. We have tried this for two years and find it effective and inexpensive."

North Carolina

THERE is little snow in North Carolina, but W. S. Fallis, State Highway Engineer, writes that he finds it best to remove even light falls of snow from top soil roads in order to prevent the roads from softening. He says that this work pays better than any other maintenance work done during the winter in North Carolina.

Oregon

DUE to its mild climate there is little necessity for the removal of snow from the Oregon highways, especially in the western part of the state. In the eastern part there often is considerable snow but the traffic is so light that no concerted effort has been made to clear the roads.

Pennsylvania

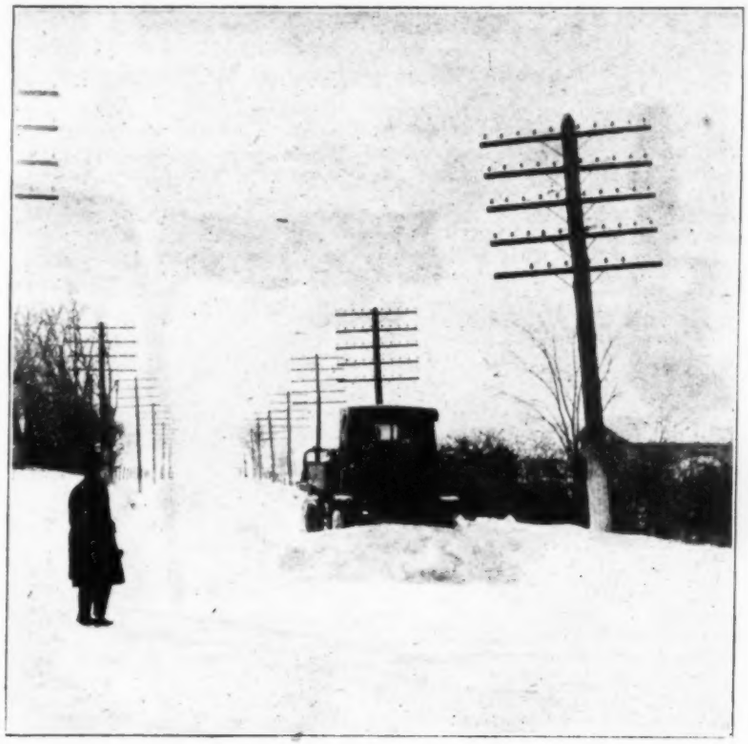
IT is a pity that the limitations of space prevent the publication in full of the article written by George H. Biles, Assistant Highway Commissioner of Pennsylvania, the state that leads all the rest in the matter of snow removal. Mr. Biles writes:

"There are two fundamentals in snow removal work that are essential to success, and these are preparedness and perseverance. In speaking of preparedness, one naturally thinks first of labor, equipment, organization, etc., but power to anticipate is of inestimable value and exemplifies the axiom that "Forewarned is Forearmed." This is made possible through the cooperation of the United States Weather Bureau Office in furnishing forecasts of approaching storms either by wire or mail, depending upon the importance of the districts affected.

"Upon the first appearance of snow, the work resolves itself into one of perseverance for it is only by fighting the succeeding storms that success can be attained.

"Pennsylvania has a colossal maintenance proposition in the care of over ten thousand miles of all kinds of highways, improved and unimproved, employing at certain periods of the season over twelve thousand men, and was fortunate when called upon to keep the highways open to have a system of organization and management based on modern scientific business principles, flexible and practicable enough to expand naturally and take over this added responsibility.

"Since the organization of the Maintenance Division of the Pennsylvania State Highway Department in 1913, composed of the Assistant Engineers, County Superintendents, caretakers, laborers, etc., which has complete control of the snow removal work under the direct supervision of the Second Deputy Commissioner, studies have been made of snow conditions on the main trunk lines and at a number of places it has been shown that snow fence is the most economic plan and considerable fence has been constructed and is being put in place at the present time. A fair average price for the fence complete in place at the present time is 50 cents per foot. The design is similar to the standard used by the large railroad companies consisting of eight hemlock boards ten feet long six inches wide and one inch thick placed six inches apart and framed together with three braces of two by four hemlock, placed three feet nine inches apart from the center, to which is bolted at each brace and nine inches from the top a two by four support six feet six inches long. These supports are bolted to hemlock stakes driven in the ground fifteen inches, which are two feet six inches long and made of two inch by three inch material. The frame is held in place in front by additional stakes driven in the ground vertically, which are two feet six inches long and also two by three material. There is approximately seventy-five feet of lumber in each ten foot section of fence.



PLOW PUSHED BY A TRUCK ON A PENNSYLVANIA ROAD

"Just recently a case was brought to my attention where we were expending approximately two hundred dollars per year to open the drifts on a certain short troublesome section of highway in one of our northern counties, that the placing of three hundred fifty feet of snow fence relieved us of further expenditures and promoted great local satisfaction.

"Aside from the local demands last winter, our State was called upon to keep the main trunk lines open for the use of the United States motor convoys operating between the central west and the seaboard. The route in this State extends from the Ohio State line to the Maryland State line, a distance of approximately two hundred twenty-five miles.

The system of operation for handling this work, established and used by the State Highway Department, will be described briefly: Arrangements were made with the Weather Bureau Office at Pittsburgh and weather forecasts wired both to the main office of the Department at Harrisburg and the local designated stations along the line of the important Government motor convoy route. Upon receipt of this information, instructions were sent to the various districts to organize men and equipment for action. Stationed at the larger towns along the line of the

Commonwealth of Pennsylvania | Form No. 661 Daily Report Road Conditions | State Highway Department

Weather Cond. | Road Cond. | Date: 12/7/20 | County: Somerset

Route and Section	Clear	Cloudy	Rain	Snow	Dept. of Snow	Date Opened	Good	Fair	Poor	Slippery	Impass.	Remarks
119 A		✓		✓	18"	12-7-20		✓				Open to all traffic
" B		✓		✓	16"	"		✓				Numerous drifts
" C		✓		✓	14"	"		✓				2' to 3' in removed
" D		✓		✓	20"	"		✓				today on all
												Sections

Supt. R. S. Meyers

DAILY REPORT CARD ON ROAD CONDITIONS USED IN PENNSYLVANIA

highway were motor trucks equipped with snow plow attachments, road machines, drags, shovels, etc. The patrol system of men who were employed regularly on the highway formed a nucleus to create the larger forces to handle the work. Each caretaker or patrolman was assigned to a certain particular section with instructions to report conditions immediately to the district head or Superintendent, who in turn either wired or phoned the main office at Harrisburg. If the conditions were abnormal, the Superintendent of Highways of the County communicated with the Assistant Engineer who arranged an immediate inspection and authorized such steps to be taken as were deemed necessary to expedite the work. The first report of the local man was followed by a postal card report form giving the details and addressed to the central office. This information was charted as soon as received and bulletin maintained at all times for general information. If the drifts were unusually deep and the road not opened within twenty-four hours, headquarters was advised which afforded an opportunity to keep in complete control of the entire work at all times.

"Aside from the dearth of labor that was felt over the entire country at this time, there were sections wherein it was impossible to get labor of any character and the mountains and villages for miles around had to be scoured for hands, who were transported by sleighs to the site of the work.

"Work began when the heavy fall of snow came in the early part of December by breaking a track with road drags and small "V" shaped plows drawn by teams. These were followed by road machines or motor trucks with plow attachments. Turnouts were made at convenient intervals and as soon as possible thereafter the road was widened to a width of between fourteen and eighteen feet, depending upon the location. The entire travelable width of roadway was finally opened in order that traffic would not cut through to the road surface during periods of freezing and thawing as has already been mentioned.

"The snow at first was removed to within three inches of the road surface and what did not melt afterward was removed entirely.

"I will qualify remarks just made by saying that these methods apply particularly to improved roads, for if traffic is permitted to track during periods of freezing and thawing on such highways, the surface becomes affected to various degrees, depending on the type of the road. We have a number of miles of waterbound macadam roads with bituminous surface treatments on the main trunk lines and in order to preserve them during such periods, it is essential to distribute the traffic. On the unimproved roads the snow is not taken off entirely down to the surface, but several inches is left remain for the travel to pack, and as it softens more snow is dragged from the sides, in order to keep the surface comparatively smooth at all times. Rolling of snow is done on the lesser important lines, but this has not been very satisfactory on the roads where there is much motor traffic, on account of the rough condition that results when the surface becomes cut up. The snow being rolled and wet from time to time with sleet and rainstorms, becomes almost as hard as ice. However, there are a number of roads where the travel is light and used mostly by horse-drawn vehicles, where this method will suffice.

"There were heavy drifted conditions where special treatment had to be resorted to. These were generally located in cuts where drifts were so deep and banks so high on either side that the snow had to be shoveled and hauled out. As soon as any portion of roadway was open, shovelers followed cutting openings from the edge of the road to the side ditches at various points along the road and which assisted greatly in the protection and drainage of the surface. In addition to this, all side drainage and culverts were kept open and free of obstruction. This precautionary measure produced very good results and when the snow passed away in the spring, the general conditions were in better shape both as to drainage and surface than they had been at any previous time, in spite of the fact that the roads had suffered greater traffic and increased weights of loads than they had at any time in their history.

"Snows up to twelve inches in depth can be handled advantageously with road machines and from twelve to thirty-six inches, if not too heavy, can be moved with motor trucks with plow attachments, with excellent results. The truck is run along the one side of the highway and back on the opposite side at the rate of about four miles per hour and carries a small crew of men with shovels that are used when the snow piles up in front of the blade which it will do especially when the snow is wet. When there is a greater depth than three feet a large "A" shaped plow is used. This implement is thirty inches high at the nose and six feet at the back with twenty foot legs and sixteen feet wide at the back, made of two and one-half inch oak plank and four inch by four inch framing, held together with moveable braces and drawn by a heavy tractor, and it has proven a very economical and effective device. The moveable braces are provided for the purpose of permitting vehicles to pass during the operation, if same is necessary. The light tractors for this work do not hold the road and have been found unsatisfactory. Mechanical devices are preferable in the majority of cases but if the drifting is a continuous performance in cuts, it resolves itself into a shoveling proposition.

"To keep the roads open under conditions similar to last winter, it costs from $50.00 to $200.00 per mile, depending upon the location and other conditions.

Rhode Island

THE situation in Rhode Island is described in the following letter from I. W. Patterson, Chief Engineer of the State Board of Public Roads:

"Our state highway law provides that snow removal upon state highways be done under the direction of local authorities. This department therefore has no official interest in snow removal unless special appropriations for the purpose of snow removal upon state highways are made. The first instance of an appropriation of state funds for the purpose of snow removal upon state highways was during last winter when an emergency appropriation of $50,000 was made for snow removal upon state highways. The funds involved in this appropriation unfortunately did not become available until approximately ten days subsequent to the severe blizzard early in February which blocked the roads very effectively. Since our law placed no responsibility for snow removal with this department we of course were not equipped with machinery to handle snow. The date of the appropriation also was so late that the snow had become compacted to such an extent that it was largely a case of ice removal rather than snow removal. We were fortunate enough to purchase three snow plows of the type employed upon motor trucks soon after the funds were available, but this equipment was absolutely worthless in view of the fact that the snow was so consolidated by alternate freezing and thawing.

"We started work as soon as the funds were available and this work made possible the opening up of several very important lines to travel somewhat sooner than the elements would have accomplished the work. Advantage of thaws was taken and the snow scraped off in layers as it thawed with ordinary road scrapers hauled by trucks and by snow plows attached to trucks. The greater part of the work, however, had to be done by hand. It goes without saying that our snow removal during the past season was not done economically. It was simply a case of trying to relieve a very serious condition without proper equipment and after the period in which the work would have been done economically."

Vermont

UP in Vermont the people still depend on sleighs during the winter months and, according to a letter from the State Highway Department, probably they would object if there were not snow enough for good sleighing. The letter says:

"During the windy weather, which prevails largely during the months of February and March, the snow is piled to a great depth in many localities. Outside of city and village streets, the writer knows of only one incident where an attempt was made last winter to remove the snow continuously from any one piece of road so that motor trucks might be operated. This was a little less than a mile long from a point where a power development dam was being constructed to a trolley line.

"The method of removing the snow was by a V-shaped wooden scraper, which pushed the snow to both sides of the road and cleared a path about 8 ft. wide. The plow or scraper, whichever you might call it, was drawn by motor trucks or by horses. This left a roadway over which motor trucks could be operated, but was not wide enough for two vehicles to pass as the snow was piled from 4 to 10 ft. deep on each side of the road. A few turn out places

were made by hand shoveling to make it possible for vehicles to pass. I am informed by the man in charge of the work that it cost between $800 and $900 to keep the snow removed. The day the writer visited this place, it was windy and the snow was blowing into the trench faster than two snow plows and several shovelers could keep it out.

"The usual method of dealing with snow in Vermont is to roll it down with heavy wooden rollers and keep the traffic on top of it. When it drifts so deep that this does not make a safe and satisfactory road the surplus is removed by hand shovelers or by scrapers. Many towns find the maintenance of this kind of snow road during a few months in the winter nearly or quite as expensive as the maintenance of their earth roads in the summer."

Virginia

A COMPREHENSIVE letter from the State Highway Commissioner of Virginia, who wrote to his eight resident engineers for reports on snow removal, follows:

PULLING AND PUSHING A SNOW PLOW IN MICHIGAN

"A complete study of all the replies which I have received shows that the following methods were used: first, a road machine pulled by mules or by motor trucks; second, a V-shaped wooden snow plow pulled by motor truck; third, snow plow equipped with wheels and attached to the front of a motor truck; fourth, by hand.

"For such snow as usually falls in Virginia, particularly in the central and southeastern half of the State, we have found the use of a V-shaped wooden snow plow very effective if used immediately after the snowfall and before the snow has been packed by traffic on the roadway. We have had very good success in pulling such plows behind motor trucks. At a speed of ten or twelve miles per hour, the snow is forced well to the sides of the roads. In case it is impossible to remove the snow before it is packed, we have found it is more readily moved by the use of the ordinary six-horse road machine with a four-wheel drive motor truck. Our experience with the snow plow with wheels, attached to the front end of a motor truck, leads us to believe that this form of snow removal is suited only to such surfaces as concrete, asphalt, or brick.

"In the northern and northwestern part of the State, during the winter of 1919-20, an unusual condition arose when a sleet of several days' duration was followed by extremely cold weather. On some of the roads in this area it was possible to get to work removing snow before the accumulation of sleet could freeze up. On other roads, however, this was impossible, and the consequence was a solid sheet of ice, about 8 in. thick, formed over the entire surface of the roadway, which remained on the roads for nearly 6 weeks. We found it absolutely impossible to remove this ice sheet by the use of any machinery at our disposal, and it became necessary to use picks and shovels to remove the ice sheet from sharp curves and steep grades, to minimize danger at these points.

"One objectionable feature of the form of snow removal which we are using is that, in the case of a heavy snow, so much material is pushed into the ditches that if it thaws rapidly we are liable to have badly washed shoulders, resulting from the flooded ditches. This is a condition, however, which cannot be avoided, except at an unwarranted expense."

Wyoming

MOST of the roads constructed in Wyoming are elevated slightly above the level of the surrounding country. This is done so that the constant winds will blow the snow off during the winter months. Whenever a new road is located the problem of keeping it free from snow is considered, especially where cuts are made on hillsides. On the Salt Creek road, which feeds one of the big oil fields, various schemes were tried out last winter for getting rid of the snow. A grader pulled by a tractor proved to be the best, especially on the paved portions of the road. North of Cheyenne one of the main roads was opened after severe storms by the use of a big V-shaped plow pushed by two motor trucks, which cleared a width of about 15 ft. It worked well except where the snow was packed thick.

A CLOSE-UP OF THE PLOW

The Other Snow States

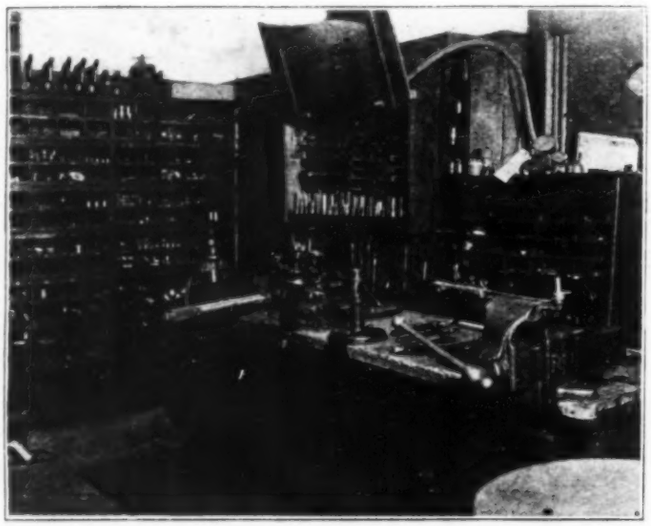
A LARGE number of the state highway departments of the "snow states" wrote that, for various reasons, they had done no snow removal work. In most cases the reasons assigned were: Lack of power under the state laws to undertake such work or lack of funds for such purposes. In most of these states the counties or other local units were charged with the responsibility of removing the snow. The states which reported that they had done little or nothing were: Idaho, Kansas, Kentucky, Maine, Maryland, Massachusetts, Missouri, Montana, New Hampshire, New Mexico, North Dakota, Ohio, New Jersey, South Dakota, Utah, West Virginia and Wisconsin.

MAKE EVERY TOOL DO ITS SHARE

Efficiency Engineer of a Big Organization Tells How He Does It

By E. C. E.

IN perhaps the largest oil refinery in the world, located at Philadelphia, the care of small tools, as well as large tools, is given the same careful detailed attention as are any of the larger elements in the manifold activities required to transform crude oil into the thousand and one products which are turned out by the modern oil refining company, ranging from the finest watch oils to the asphalts and coke residuals.

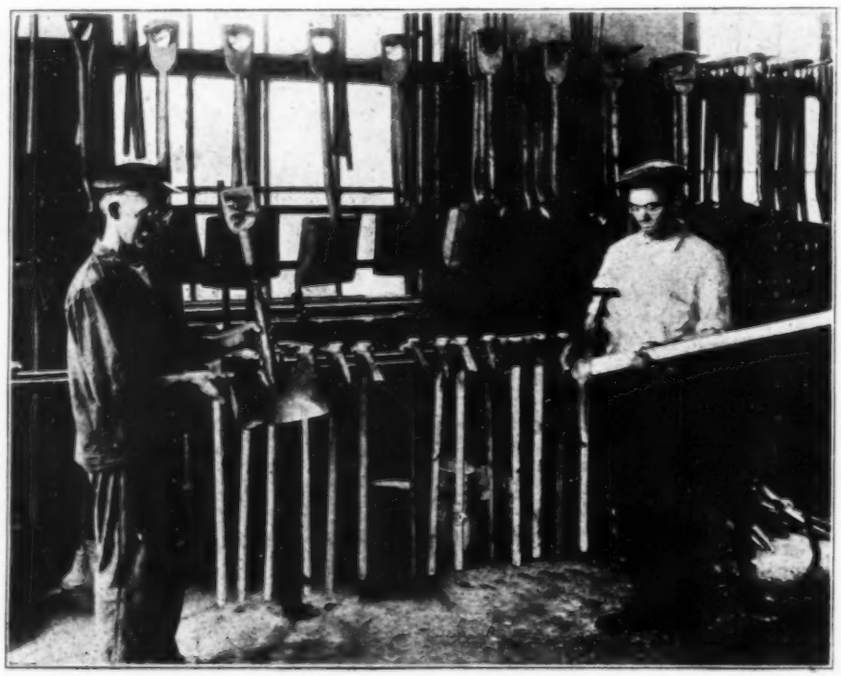


CORNER OF PNEUMATIC TOOL REPAIR DEPARTMENT THROUGH WHICH HUNDREDS OF TOOLS PASS

Each class of tools receives separate specialized attention, in order that the tools may be turned over to the mechanics, their helpers and even laborers in the best of condition and in order to stand the rugged, severe service required in a plant of this kind. For example, pneumatic tools are maintained in perfect working condition by the tool department itself so that there is nothing for the man who operates the tool to do, except the single item of operating the tool. The inspection, the test, the cleaning and oiling of the tool are handled by the tool department in the following manner:

The tools must be ordered by the mechanics' foreman the day previous and the mechanic on arriving at the Works gate in the morning, receives with his time card an aluminum disk which is stamped with the code number of the tool, or the kit of tools which has been ordered by his foreman the day before and provided for him during the night by the night tool force. He immediately proceeds to the tool house, hands in his disk and receives a tool, (for example, a pneumatic riveting hammer). This riveting hammer is in a heavy galvanized sheet iron tool box, together with the necessary rivet sets, an oil can and a wiping cloth. The tool is used during the day and the operator has instructions to oil it at least every hour. At the end of the day he places his hammer in the box, together with the rivet sets, the oil can and the wiping rag, and turns them into the tool-house when the whistle blows for quitting.

The night force of the tool room opens the box, takes out the tool, places it in a bath of oil. The tool-house attendant opens and closes the trigger valve and allows the cleaning oil to flow through the hammer and valves, washing out all dust and grit. The cleaning oil also cuts out any gummy lubricating oil which may have accumulated, or any small particles of rubber from the air hose, etc. The machine is then hung up to drain and after being properly drained, it is placed back in the tool box ready for another day's work, the man calling at the tool house with his check the succeeding morning. This routine is followed in the same manner each day and also applies to caulking, chipping and scaling hammers.

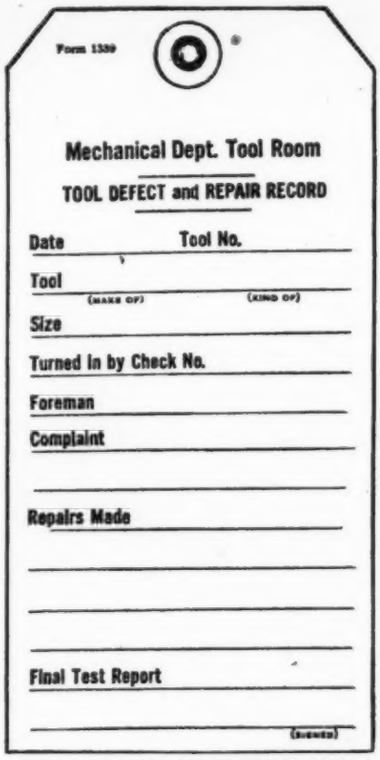


GAUGES ARE USED TO MEASURE SHOVELS AND PICKS AND THOSE WHICH DO NOT STAND THE TEST ARE SCRAPPED

As soon as a pneumatic tool shows signs of unsatisfactory service, the mechanics have general instructions to return the tool to the tool department immediately **without any** formality in the shape of an order, and to receive another tool in its place. The tool department makes an immediate inspection and test of the tool, and attaches to it a linen tag showing

the check number of the man turning in the defective tool, the number of the tool and the date. The tool is then turned over to the repair force in the tool department who inspect and test it thoroughly and make necessary repairs, making a record on the tag of exactly what the repairs consisted of, the repair parts installed and the cause for the repair. In this way if negligence on the part of the mechanic is found to be the cause, the mechanic is censured, cautioned or penalized, according to the needs of the occasion. As soon as the repairs are completed, the tool is placed in reserve, ready for work when the need arises.

The economy of this method of inspecting, oiling, cleaning and repairs to pneumatic tools is evidenced by the fact that one man and a helper keep a total of approximately 550 pneumatic tools in repair, in addition to which these same men make all necessary repairs to about 30 oxy-acetylene cutting and welding tools, handle the grinding of drills on an automatic drill grinding machine, keep in repair a total of approximately 30 electric drills of various sizes, etc.


Form 1339

Mechanical Dept. Tool Room

TOOL DEFECT and REPAIR RECORD

Date Tool No.

Tool

(MAKE OF) (KIND OF)

Size

Turned In by Check No.

Foreman

Complaint

Repairs Made

Final Test Report

(SIGNED)

THIS TAG IS ATTACHED TO A TOOL WHEN IT IS SENT IN FOR REPAIRS

One of the items which we consider important in the maintenance of pneumatic tools is the constant checking of the quantity of air consumed by these tools, it being one of the items in the testing of all repaired tools to test the consumption of air by means of a toolometer, and where the air consumed is excessive, the tool is laid aside for a special inspection by the head of the tool department who makes the decision as to whether or not the tool should be scrapped or maintained in service. It should be mentioned in closing that we have standardized on certain types and makes of pneumatic tools for the various services required in our business, and adequate repair parts for these standard types of tools are maintained in the tool department at all times.

After considering the specialized care given an expensive tool, like pneumatic tools as described above, it may be of interest to illustrate the manner in which the humbler class of tools, such as shovels and picks are maintained, to show that the care and maintenance of tools is carefully provided for in every class.

After careful investigation several years ago, it was determined that the labor loss in the past of shoveling with hand shovels was worth looking into, and it developed that when 7/8 in. to 1 in. had been worn off, the capacity of the shovel had been reduced approximately one-third, with the result that practically one-third of the efficiency of the laborer handling the shovel was lost. In many cases it was found that laborers were working with shovels which had only half the capacity of a new shovel. Naturally the laborers always selected the smaller shovels with resultant loss to the Company.

It was then decided to have gauges provided in the tool department, and all shovels when turned in at night are gauged, and when a shovel is worn to a size below the gauge, the shovel is scrapped, regardless of its condition, and it is our feeling that largely increased efficiency is obtained by this means.

The same procedure obtains with regard to picks operated by laborers, the length of picks being gauged at night, and as soon as a pick is worn in size below the gauge, it is scrapped and a new pick provided.

These checks, together with many others, are maintained by constant and painstaking inspection in the tool departments, and by placing the responsibility on certain persons whose duty it is see that these systems are adequately maintained.

TANK AND RACK USED IN CLEANING AND OILING PNEUMATIC TOOLS

Concrete Pouring Begins on Maricopa Roads

WORD comes from Twohy Brothers at Phoenix, Arizona, that the work of pouring concrete on the big Maricopa County road system described in SUCCESSFUL METHODS last month, began on October 19. This means that the job is going forward in good shape. The progress of this 278-mile job will be followed with interest by those interested in road building.

A FOUR CONTRACT JOB

Work On Great Western Gateway at Schenectady, N., Y., Is Divided Into Four Units

By Gordon P. Gleason

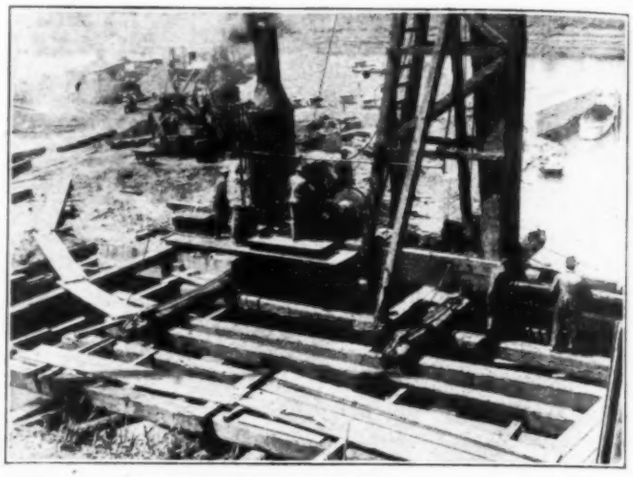
WORK is well under way on the job of building the reinforced concrete abutments and approaches at the Schenectady and Scotia ends of the Great Western Gateway in New York State. The bridge which will carry the main State highway between the East and West over the Mohawk River and Barge Canal channel,

CONSTRUCTING WOODEN CRIB TO BE SUNK IN STREAM

is shown in the engineer's drawing at the bottom of this and the opposite pages.

The equipment for this job consists of a pile driver and derrick for placing the pedestal piles, an excavating machine, used in digging the trench for the reinforced concrete approach walls, two concrete mixers and a variety of other items, including a cofferdam. This is just the beginning of work that will ultimately involve the use of many additional items of equipment and will call upon contractors for some thoroughly modern methods and some big work.

The structure, which has been planned and designed by State Engineer Frank M. Williams of New York, is

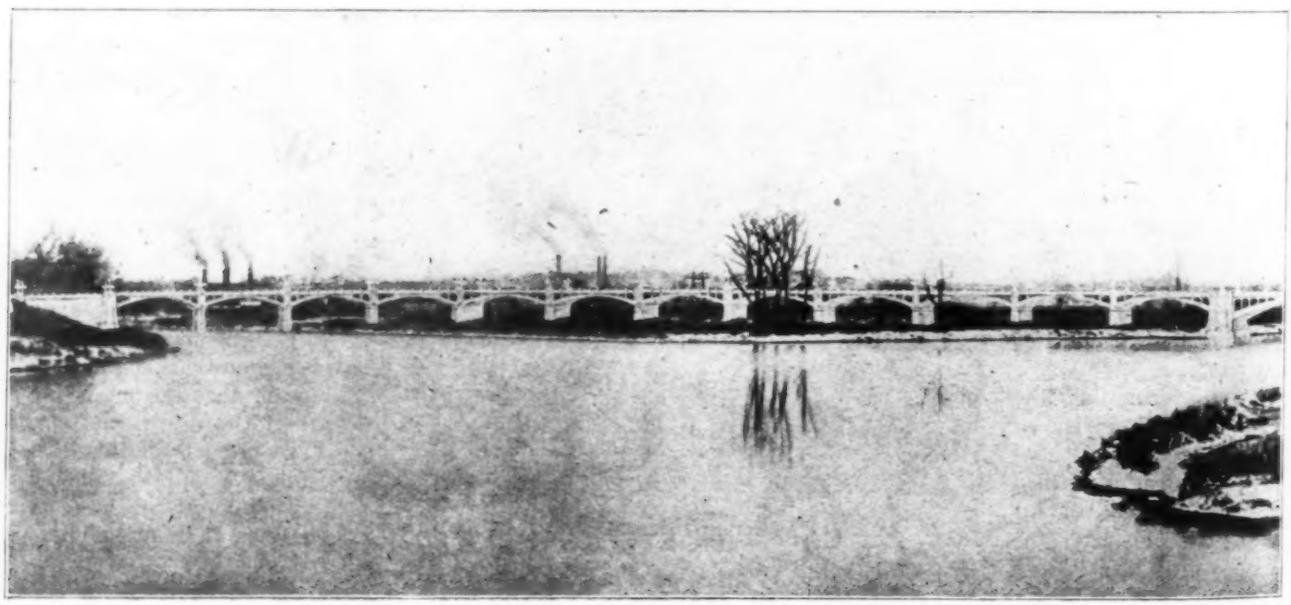


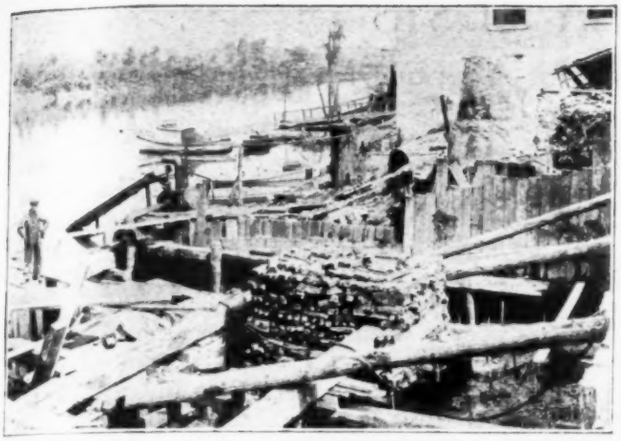
SOME OF THE EQUIPMENT USED IN CONSTRUCTING ABUTMENTS

to be built of reinforced concrete and, aside from the fact that it will serve as the roadway over which most of the automobile traffic between the East and West is to pass, it will have the distinction of being one of the nation's most beautiful parkways.

The Great Western Gateway derives its name from the fact that Schenectady is located at the point in New York where there is a natural break in the great Appalachian Mountain chain extending along our eastern coast. It was through this gap or gateway that the early settlers made their way westward and it was this same breach that made the construction of the Erie Canal a possibility.

The new structure will extend from the intersection of State Street and Washington Avenue, Schenectady, to the approximate center of Mohawk Avenue in the village of Scotia thereby leading directly to the State road to Buffalo. The bridge will be 4,436 feet in length and the Schenectady approach will be provided with a raised





TESTING ONE OF THE PILES BY LOADING IT WITH 30 TONS OF PIG IRON

safety zone which will serve as a regulator of traffic. A 40 ft. roadway will span the new Barge Canal Terminal Basin, VanSlyke Island, Barge Canal, Hog Island and Mohawk River. This road will end in a circular traffic center.

Provision is made to carry the trolley tracks over the water and islands by utilizing the center of the roadway and two sidewalks each 6 feet wide, will also be provided. These will be protected by concrete balustrades.

Under the plans decided upon by Mr. Williams the structure will represent an expenditure of approximately $2,000,000 of which amount the City of Schenectady has contributed $100,000 and the village of Scotia $50,000. The structure is to be erected by the contract method but differs from others in that, instead of being let in a single contract, the work has been split up into four parts. Each part will cover a different phase of the work and the four units are to be awarded at different times, the intention being to so coordinate the work that as one contract nears completion the other can get under way.

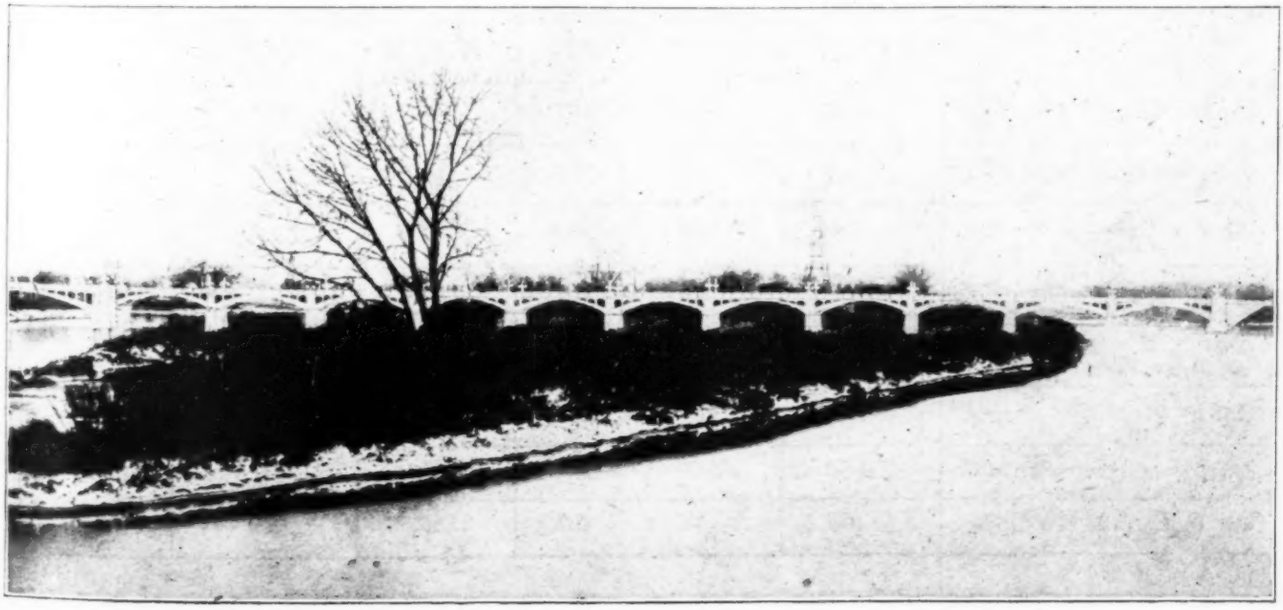
The first contract covers only the construction of the approaches and abutments at each end of the structure. The second contract calls for the construction of 23 reinforced concrete piers. Provision is made in this, however, for the construction of piers 1 to 4 and 19 to 20 inclusive by December 31, 1920 and the completion of all the piers by December 31, 1921. Under this plan the piers at the east and west ends of the structure will be completed first, thereby enabling the contractor who obtains the third contract, calling for the erection of the reinforced concrete arches and superstructure, to start work at both ends of the bridge early next spring. In the meantime the fourth and last contract which calls

ONE OF THE CONCRETE APPROACH WALLS SHOWING METHOD OF REINFORCING

for the paving and lighting work will have been advertised, so that as the third contract progresses the work of paving the roadway can be undertaken.

This plan, it is confidently expected will see the structure well under way next summer and early in 1922 the bridge will be opened to traffic. A feature of the bridge is the 212 foot span over the Barge Canal channel.

The important part which the Great Western Gateway is to take in the development of automobile and commercial traffic in the State of New York may be judged by the fact that the old toll bridge now spanning the Mohawk River at this point, collects toll from an average of 1,000 automobiles daily while numerical count shows that 22,000 people cross the bridge every 24 hours.



COOK COUNTY COSTS

Figures on Concrete Road Work Prove Need for Adopting Most Modern Methods

By A. W. Consoer

THE prevailing high costs of constructing highways and the rapid increases in the prices for labor and materials on road construction are familiar facts to everyone. It is interesting to note, however, how important relatively have been the factors of increased prices for labor and higher costs of road-building materials in producing a condition of high prices for highway construction, resulting in a marked curtailment of road building in almost every state and county.

The accompanying table demonstrates that the labor cost in Cook County, Illinois, has increased at a far more rapid rate than the cost of road building materials. The figures for 1916 and 1917 are based on proposals for a particular section of road, while the figures for 1920 are based on an estimate of cost for the same section of road, which may be accepted as reliable, as it corresponds with contract costs for similar work awarded in Cook County in 1920.

This table would indicate that economics in road construction can most easily be effected by the further judicious introduction of labor-saving machinery and methods and by efforts to insure the continuity of construction operations. With the labor cost forming such a large proportion of the cost of constructing concrete roads, it is more important now than ever to make every minute count. The time is no longer distant when the successful road contractor will base his operations on the same kind of time studies that have been so successfully applied in industrial management. Along with the problem of developing continuous construction operations is the difficulty of maintaining continuous supplies of materials.

The differences in the "Per Cent Increase" of the "Total Cost of Labor Per Mile" and the "Cost of Labor Per Hour" are due to the elimination of much hand labor in the road building industry by the use of the finishing machine, unloading machinery, and other labor-saving equipment.

There are many problems in organizing a concrete road job which require an engineering analysis. It is surprising how many road contractors lay out their water supply by calculations which are little more than guesswork. The writer recently talked to a contractor who had been losing thousands of dollars because of "lack of water." He was drawing water from a creek which crossed the road under construction at the middle of the job, but unfortunately the watershed did not contribute enough runoff in the months of July and August to per-

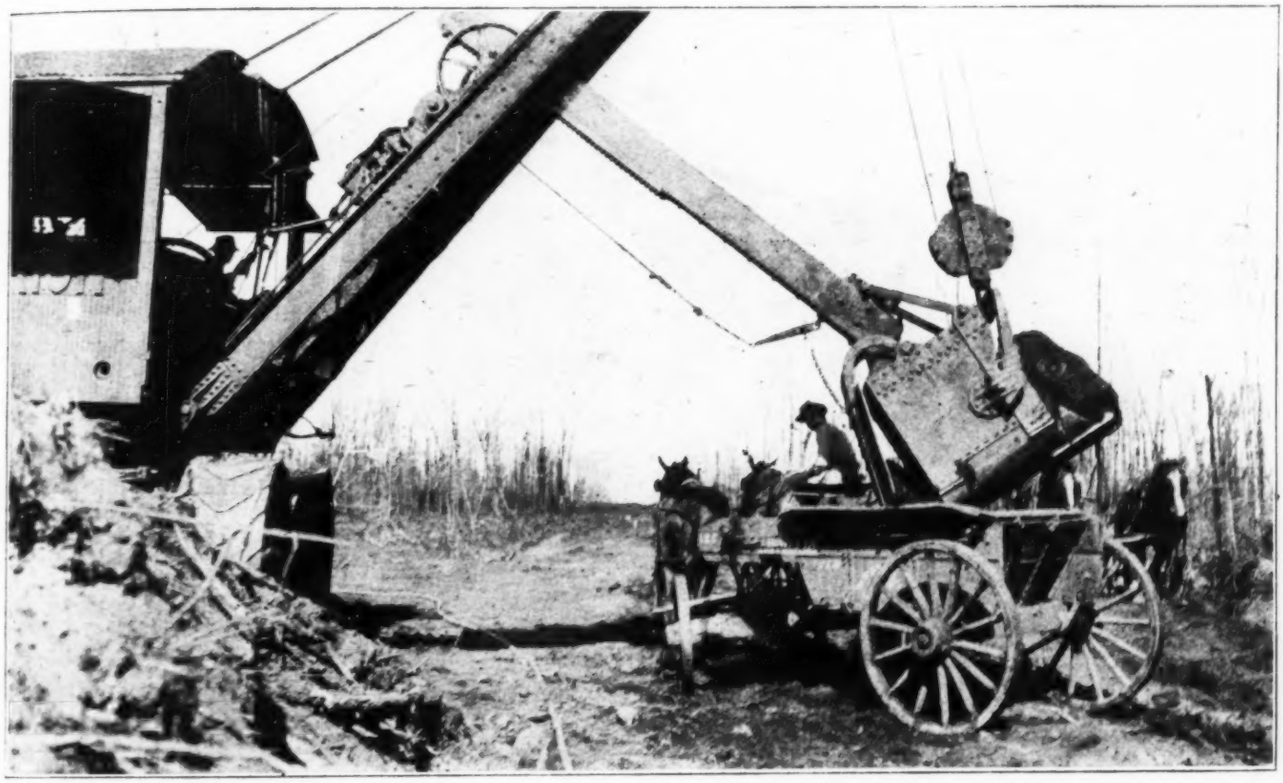
Increase In Price of Concrete Road Construction In Cook County
Length of Road 3.77 mi Width - 18 Ft. Shoulders 6 Ft

	1916	1917	Per Cent Increase	1920	Per Cent Increase Over 1916	Per Cent Increase Over 1917
Total Cost of Road	$75,886.00	$84,911.59	11 9	$156,156 05	105.8	84.0
Total Cost of Road Per Mile	20,129.00	22,523.00	11 9	41,421 00	105.8	84.0
Total Cost of Materials Per Mile	11,875.00	13,365.00	14.9	21,255.00	79 0	59.0
Total Cost of Labor Per Mile	8,254.00	9,158.00	10.95	20,166.00	144.5	120.0
Cost of Labor Per Hour	.25	.40	60.0	1.00	300	150
Cost of Teams Per Hour	.60	.75	25.0	1.10	83.4	45.7
Cost of Cement Per BBL.	1.46	1.76	20.5	2.03	39.0	15.4
Cost of Sand Per Cubic Yard	1.10	1.15	4.5	2.25	104.5	95.6
Cost of Gravel and Stone Per Cubic Yard	1.10	1.15	4.5	2.25	104.5	95.6
Cost of Steel Per Pound	.04	.045	12.5	.07	75.0	55.6
Cost of Lumber Per M	30.00	40.00	33.3	73.00	143.0	82.5
Cost of Freight Per Ton	.40	.40	0.0	.60	50.0	50.0

mit continuous operation of the mixer. By laying a mile of pipe across fields he was able to tap another watershed which provided him with an abundant supply of water. The new pump location required a much larger pump to overcome the additional head, but was worth the additional expense. No community would think of developing a system of water supply for municipal use without retaining an engineer skilled in water supply, but road contractors have not been eager to employ engineers to assist them in this way.

Although many contracting organizations include engineers in the personnel, many others do not. As road contracting operations become more complex, the services of the consulting highway engineer will become more and more necessary to assist the progressive road contractor in certain features of his construction operations.

IT CAN STAND THE GAFF



Modern Dump Wagon Gets Some Rough Treatment When Loaded by Steam Shovel

By C. P. Burton

THE picture at the top of the page illustrates modern methods in road construction. S. J. Groves & Company, Minneapolis Contractors, are building the main highway from Duluth leading into the great Mesaba Iron Range at Eveleth, Minn., the largest road contract ever let in the state. The crooked Miller Trunk road is being straightened and rebuilt to a width of 30 feet. Of the first 15 miles all but 2 miles is entirely new location and the entire job involves almost 1,000,000 cu. yd. of grading, with cuts and fills ranging from 12,000 cu. yd. down.

The soil is so filled with boulders that 20 per cent of the material is classified as loose and solid rock and has to be handled with power shovels, loading into dump wagons. The best makes of modern dump wagons made such construction possible. They will stand fearful pounding. Notice in the picture how the big dipper is slammed down on the wagon. It takes a real wagon to stand up under that strain.

There is a joke connected with this road job. The labor turnover has been heavy and frequently not enough men have been left to handle the teams at the shovel. Confronted by an emergency of this kind one morning, Superintendent E. F. Leese called the waterboy, "Kid, climb on that dump wagon and show us what you can do."

The 14-year-old youngster climbed aboard, chirruped to the horses, spotted the wagon under the big dipper and then dumped his load in place, with all the precision of a veteran, and he has been on the job ever since.

"What shall we pay the kid?" asked the superintendent of C. H. Groves, Vice-President of the company. "He got $12 a week as waterboy."

"He's doing a man's work, isn't he?" replied Groves, "Then give him a man's pay. Don't make a Bolshevik of him."

When a modern dump wagon reaches such perfection, that a waterboy can turn skinner overnight, it is a good joke all right but it is hard to figure out whom the joke is on.

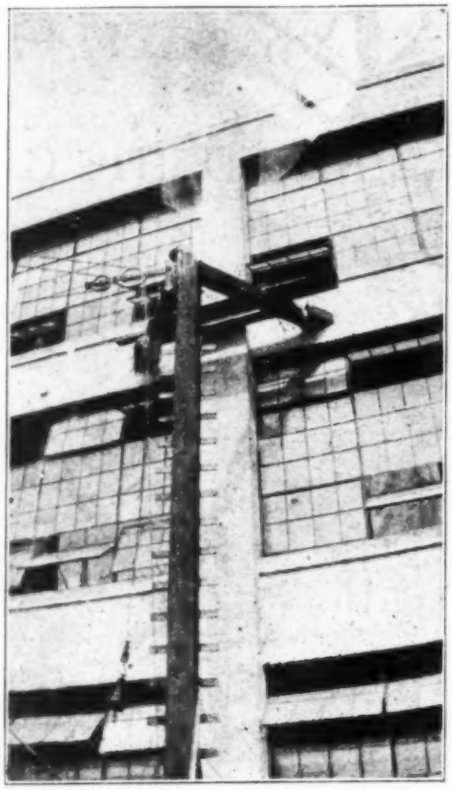
PLACING CONCRETE ECONOMICALLY

Shortcuts Reduce Costs on Job in Chattanooga

By Jack Cozine

SEVERAL useful shortcuts are cutting costs in placing concrete on a new building being erected for the Thatcher Spinning Mill at Chattanooga, Tenn., by the Turner Construction Company of New York City. The Atlanta office, Mr. Usilton, Superintendent, is in charge of the job.

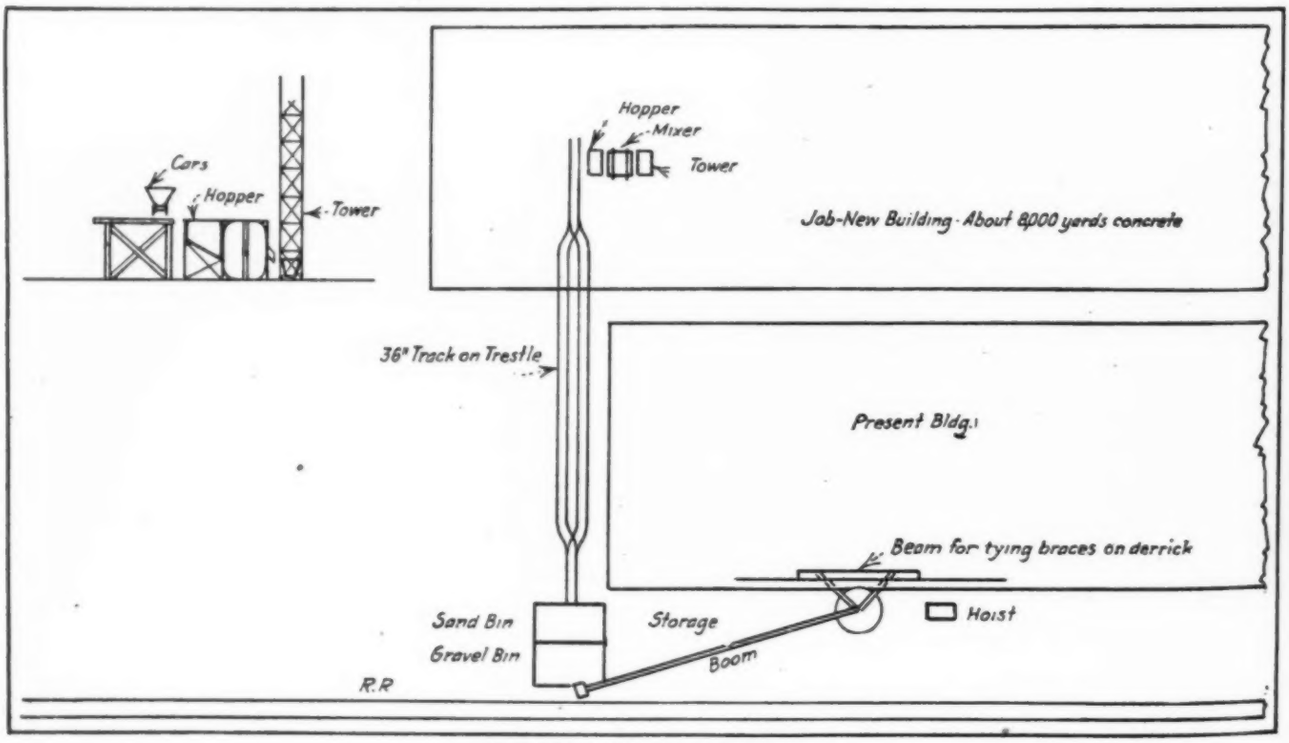
The diagram at the bottom of this page shows the general layout of the job. In order to get the material from the bin to the mixer 1-yd. V-side dump cars are used. These cars are loaded at the bin, the sand and gravel being loaded simultaneously while the cement sacks are placed on the platform built on the running gear of the car. Two of these cars are used, one being loaded while the other dumps into the batch hopper of the 1-yd. mixer. The cars are operated by a double-drum electric hoist, the cable running around two sheaves mounted behind the loading position of the car. No switches are used in tracking the cars. By cutting the rail and installing guard rails the cars take their proper tracks without difficulty. The mixer is mounted below the trestle on which the cars run and the tower is placed in the shaft of the building. The arrangements for discharging the cars into the mixer and the mixture into the elevator bucket are shown in the upper left hand corner of the diagram.



HOW THE DERRICK WAS ERECTED IN CRAMPED QUARTERS

The photograph shows how the problem of erecting a stiff-leg derrick in cramped quarters was solved. There was not room enough between the railroad tracks and the present mill building to set up the derrick in the regular way. A beam in the building was cut through and the mast of the derrick was placed as shown in the photograph. The derrick was placed just far enough away from the side of the building to give room for the bull wheel.

The diagram shows clearly the narrow space in which the derrick operates. The entire layout is one which makes the best of a difficult situation and at the same time cuts costs to a remarkable extent. From railroad track to mixer the materials move in a straight line and due to the short haul the two cars are sufficient to keep the mixer busy. And a busy mixer means low costs. The machine which is idle a good share of the time eats up the profits.



GENERAL LAYOUT OF JOB

DO YOU KNOW

1. That the amount of income tax you pay is based upon your judgment?
2. That your income tax return may be made on a basis of completed or uncompleted contracts?
3. That recent statistics published by the United States government show that a great number of contractors either overpay or underpay their taxes, thereby expending money unnecessarily or exposing themselves to severe penalties?
4. That many contractors in compiling their job costs do not make the proper distinction between repairs, plant maintenance and asset expenditures for plant?
5. How to figure your invested capital?
6. How to charge off the proper amount of depreciation on plant equipment?

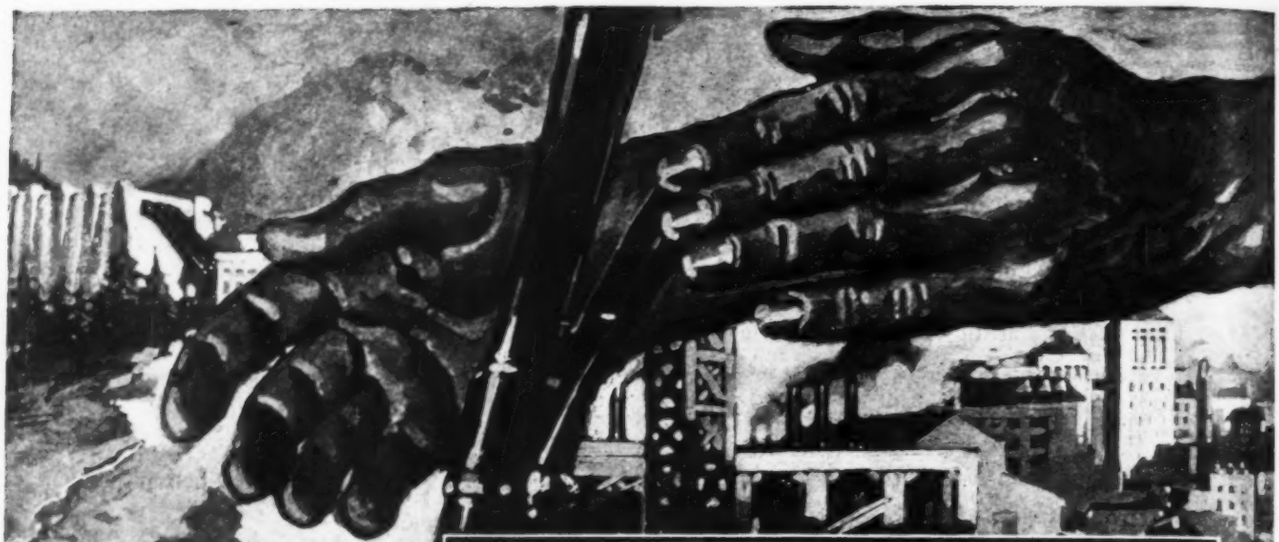
These questions and other puzzling problems created by the income tax law will be answered through SUCCESSFUL METHODS by the experts of the Richards Audit Company, an accounting organization with offices in eleven cities. If there is any phase of the income tax law affecting your business which needs explanation, write to the Income Tax Service of SUCCESSFUL METHODS, 140 South Dearborn Street, Chicago. Like SUCCESSFUL METHODS itself this income tax service is free to men who can use it.

These Members of the Richards Organization Will Answer Your Income Tax Questions

E. J. KOMAREK,
CHICAGO MANAGER

R. R. RICHARDS,
GENERAL MANAGER

J. J. REDDING,
CHIEF ACCOUNTANT



To Increase the Power of Human Hands

TO HARNESS the water power—to build highways and railways — to construct harbors — to erect buildings — to afford irrigation and drainage — to make this old world of ours a better place in which to live is a gigantic task.

Human hands — unaided — would take an eternity to produce results,—but human hands plus the economical and efficient work of labor conserving machines make the task possible and practical.

This is the function of the Allied Machinery Company of America, and it is organized to fill it. Almacoa machines to increase the power of human hands and Almacoa men to show how to do it.

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ITALY—Turin, Allied Machinery Company d'Italia, Corso Dante 40. Cable Address: ALMACOA.

JAPAN—Tokyo, Horne Company, Ltd., 6-7 Takiyama-cho, Kyobashiku. Cable Address: HORNE.

PERU—Lima, Allied Machinery Company of America, Calle Filipinas 559. Cable Address: ALMACOA.

PORTO RICO—San Juan, Earl K. Burton P. O. Box 1367. Cable Address: EKBURT.

PORTUGAL—Lisbon, Monteiro Gomes, Ltda., Rua do Alecrim 10. Cable Address: TRACTORES.

SPAIN — Barcelona, Allied Machinery Company, S. A. E. Plaza de Cataluna 8. Cable Address: ALMACOA.

SWITZERLAND — Zurich, Allied Machinery Company of America, 16 Seidengasse. Cable Address: ALMACOA.

Here's the rig

C.H&E No.10

The C. H. & E. No. 10 Portable Saw Rig was designed to meet the ever increasing demand of contractors and concrete builders for a rip and cross cut saw table with plenty of power.

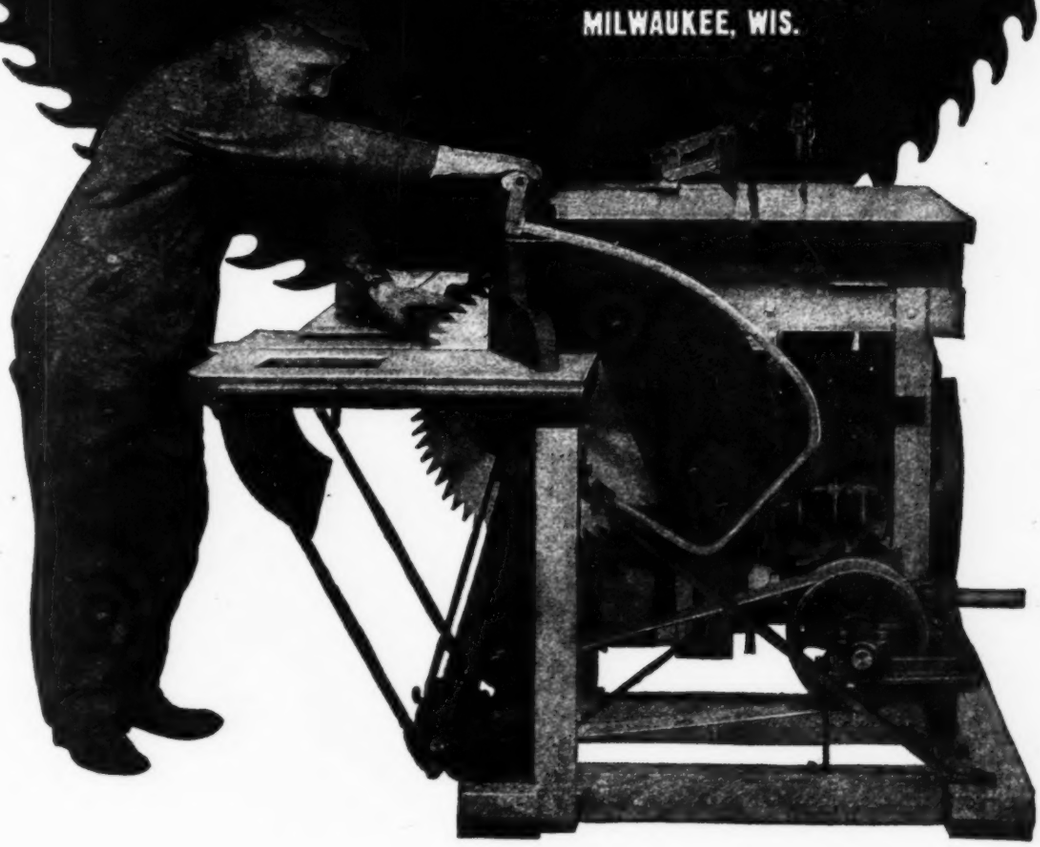
The ripping and cross cutting are independent of each other.

The cross cutting is done on a swinging arbor and both ripping and cross cutting can be done at the same time, independent of each other.

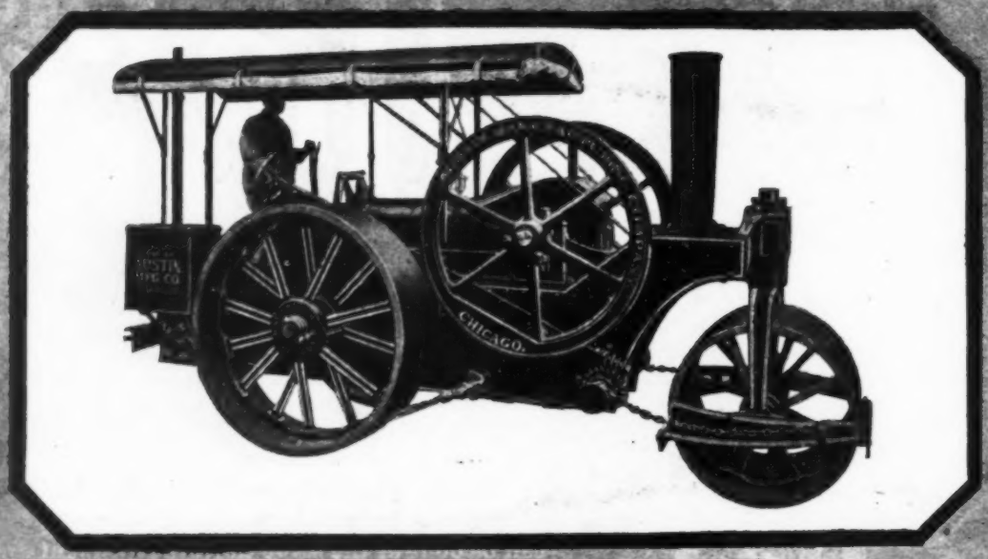
The C. H. & E. 8 H. P. two cylinder Kerosene engine solves the power problem in the operation of this outfit.

Write for Our Saw Rig Bulletin

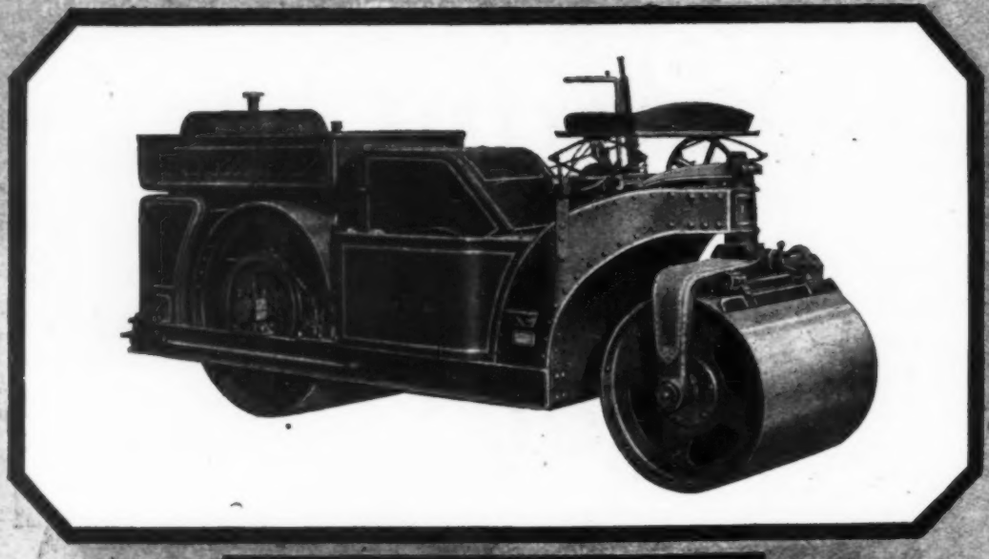
C. H. & E. Manufacturing Co.
384-A Clinton Street
MILWAUKEE, WIS.



The Economy of



Austin Kerosene Motor Roller



Austin Tandem Motor Roller

THE AUSTIN-WESTERN

Makers of:
MOTOR ROLLERS
STEAM ROLLERS
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Austin Rollers

FUEL and time saving never counted for so much in actual dollars and cents as they do today.

The day-to-day economy of Austin Rollers is another reason for the fact that Austins are the universal choice of contractors and municipalities.

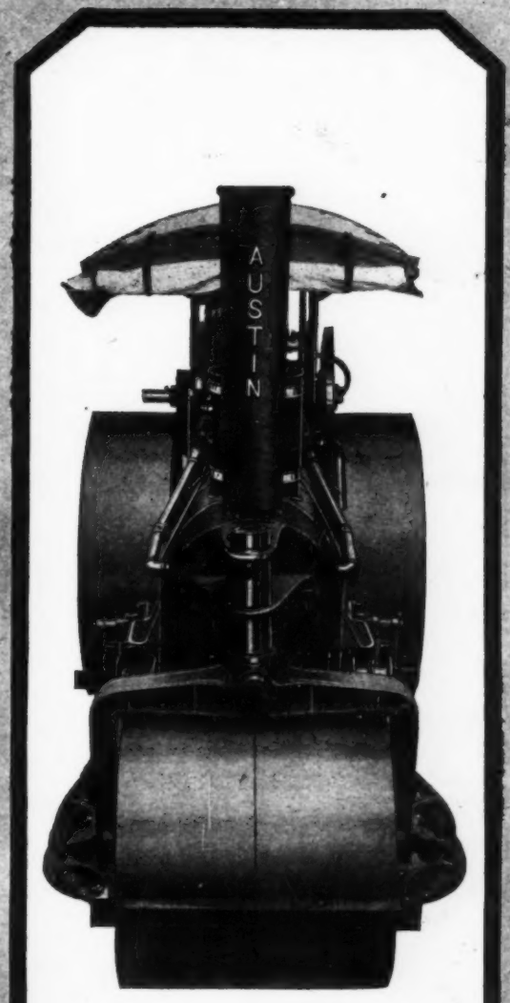
Economical in fuel consumption, economical in repairs, and economical from an operation or performance standpoint.

Day in and day out, you will find Austins doing their work efficiently, quickly, dependably and economically, in all parts of the world.

Rollers for every job—Three wheeled Motor Type in 5 sizes, Motor Tandem Type in 4 sizes and Steam Rollers in 3 sizes.

This economy is an item you cannot afford to overlook—it is made possible only by our correct design and manufacturing methods. The best proof of it is the experience of our numerous customers.

Write for the Austin Roller Catalogs



Front View Austin Steam Roller

ROAD MACHINERY CO.

ILLINOIS

NASHVILLE LOUISVILLE LOS ANGELES JACKSON
ATLANTA PITTSBURGH NEW ORLEANS PORTLAND
COLUMBUS SAN FRANCISCO

Makers of:
ROAD OILERS
ROAD GRADERS
ELEVATING GRADERS
DUMP WAGONS
STREET SPRINKLERS
STREET SWEEPERS
MOTOR SWEEPERS
ROAD PLOWS
WHEELED SCRAPERS
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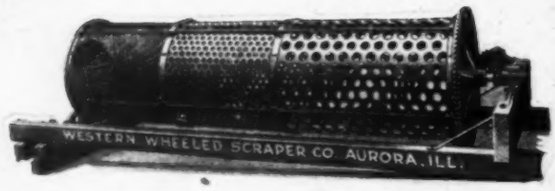
THE AUSTIN-WESTERN

For Municipal and
This Well Balanced Line - Ba

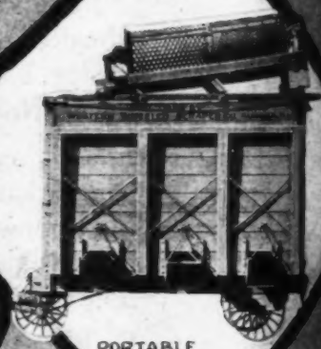
AUSTIN ROAD OILER WITH HEATER ATTACHMENT

AUSTIN

AUSTIN TWO SPEED SPRINKLER SWEEPER



WESTERN SCREEN



PORTABLE BIN

CHICAGO

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OKLAHOMA CITY	MEMPHIS	ATLANTA	LOS ANGELES	SAN FRANCISCO

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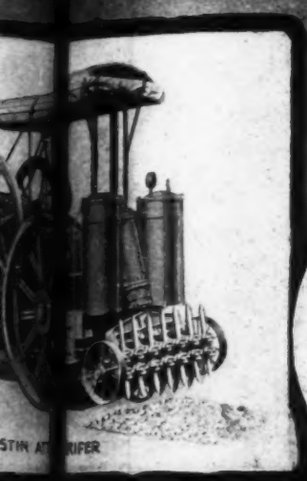
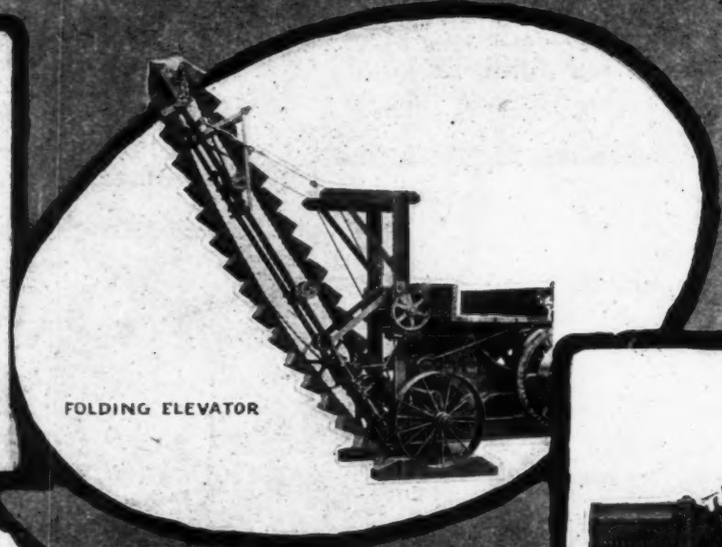
51 Chambers St., New York, U.S.A. Cables: Almacoa New York

ROAD MACHINERY CO.

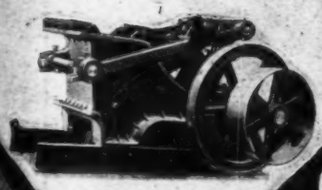
...ounty Road Work
...ed By Two Great Factories



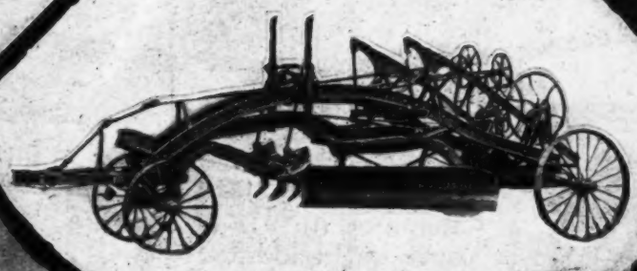


FOLDING ELEVATOR

AUSTIN MOTOR SWEEPER



AURORA TWO-BLOW STROKE CRUSHER



AUSTIN RIP SNORTER

MAKERS OF

MOTOR ROLLERS	STONE SCREENS	STONE SPREADERS	DUMP WAGONS	ROAD PLOWS
STEAM ROLLERS	STONE ELEVATORS	ROAD OILERS	STREET SPRINKLERS	WHEELED SCRAPERS
SCARIFIERS	PORTABLE BINS	ROAD GRADERS	STREET SWEEPERS	DRAG SCRAPERS
ROCK CRUSHERS	QUARRY CARS	ELEVATING GRADERS	MOTOR SWEEPERS	

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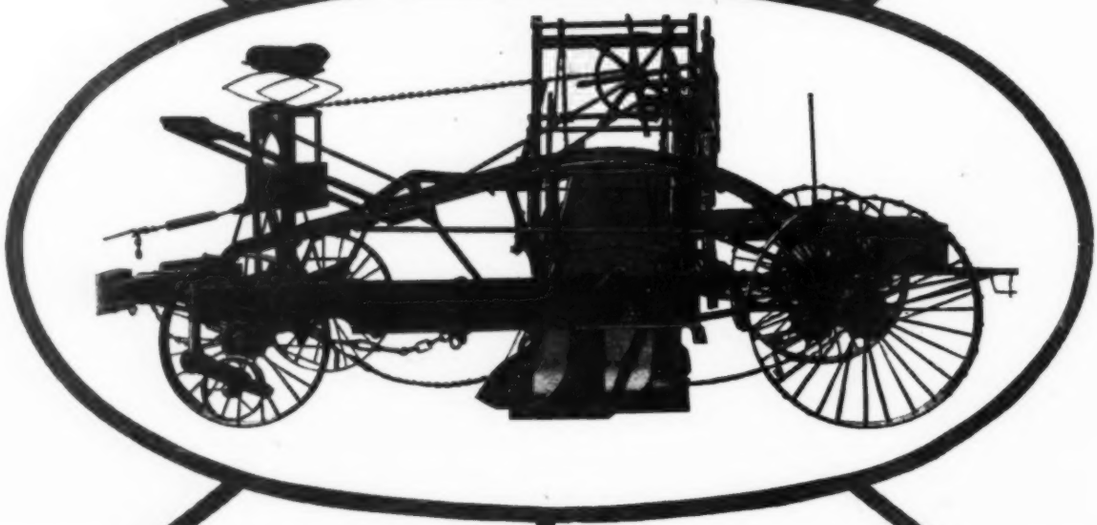
31 Chambers St., New York, U.S.A. Cables: Almacoa New York

Six Austin Advantages In Earth Moving

Made in two sizes for different kinds and sizes of jobs.

Possesses time saving features—handier and quicker than other machines.

Has capacity of 1000 to 1800 cubic yards of dirt per day.



Cuts costs in half as compared with wheelers, scrapers or plows.

Requires only one operator in addition to driver or tractor operator.

Thousands have been sold and used on thousands of miles of roads.

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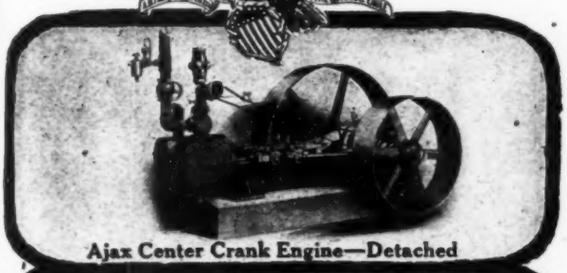
NEW ERA ELEVATING GRADER

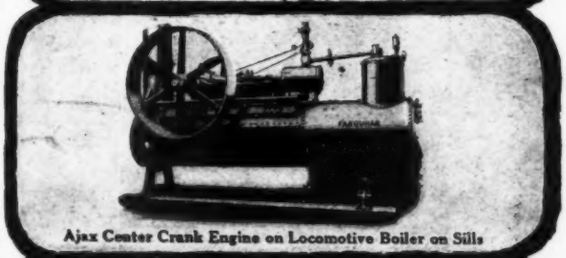
Steam vs. Gasoline

FOR the big jobs you should consider steam!

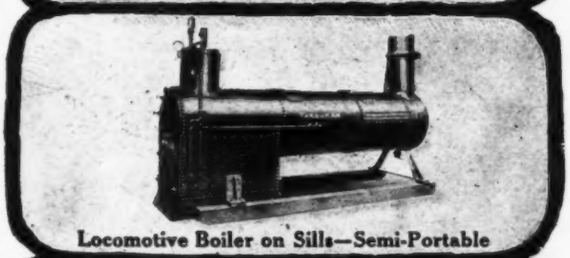


Ajax Center Crank Engine—Detached

Ajax Center Crank Engine on Locomotive Boiler on Wheels

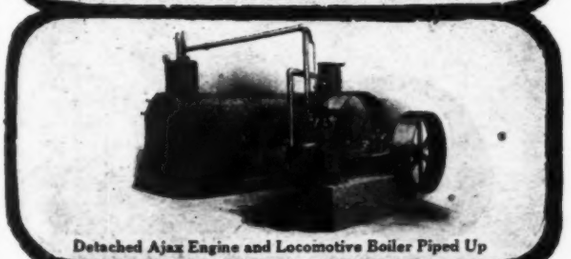


Ajax Center Crank Engine on Locomotive Boiler on Sills



Locomotive Boiler on Sills—Semi-Portable

Locomotive Boiler on Wheels—Portable



Detached Ajax Engine and Locomotive Boiler Piped Up

Because---

—the rated horse power of steam engines is usually about one-third the power developed on brake test. Not so with internal combustion engines.

—initial cost and upkeep of steam engines are less.

—there are fewer moving parts on steam engines and lubrication is simplified. No carburetor, magneto or timer to get out of order.

—steam power is more flexible—no gears to shift, and practically no vibration.

—steam power may be distributed easily and used for thawing out piles of materials, for heating "shacks" and for many other purposes.

—these are a few of the facts—a few of the reasons why contractors on the big jobs prefer steam.

The Farquhar line of steam equipment for contractors is complete. We offer both single and double cylinder tractions. Also locomotive rigs, bare boilers and detached engines as illustrated as well as vertical stationary outfits, etc.

Write for detailed information and further facts

A. B. FARQUHAR CO., LTD.
Box 478 York, Pa., U. S. A.

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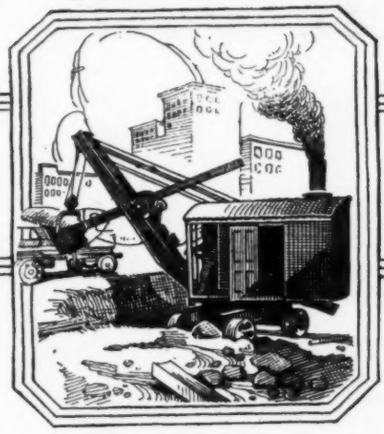
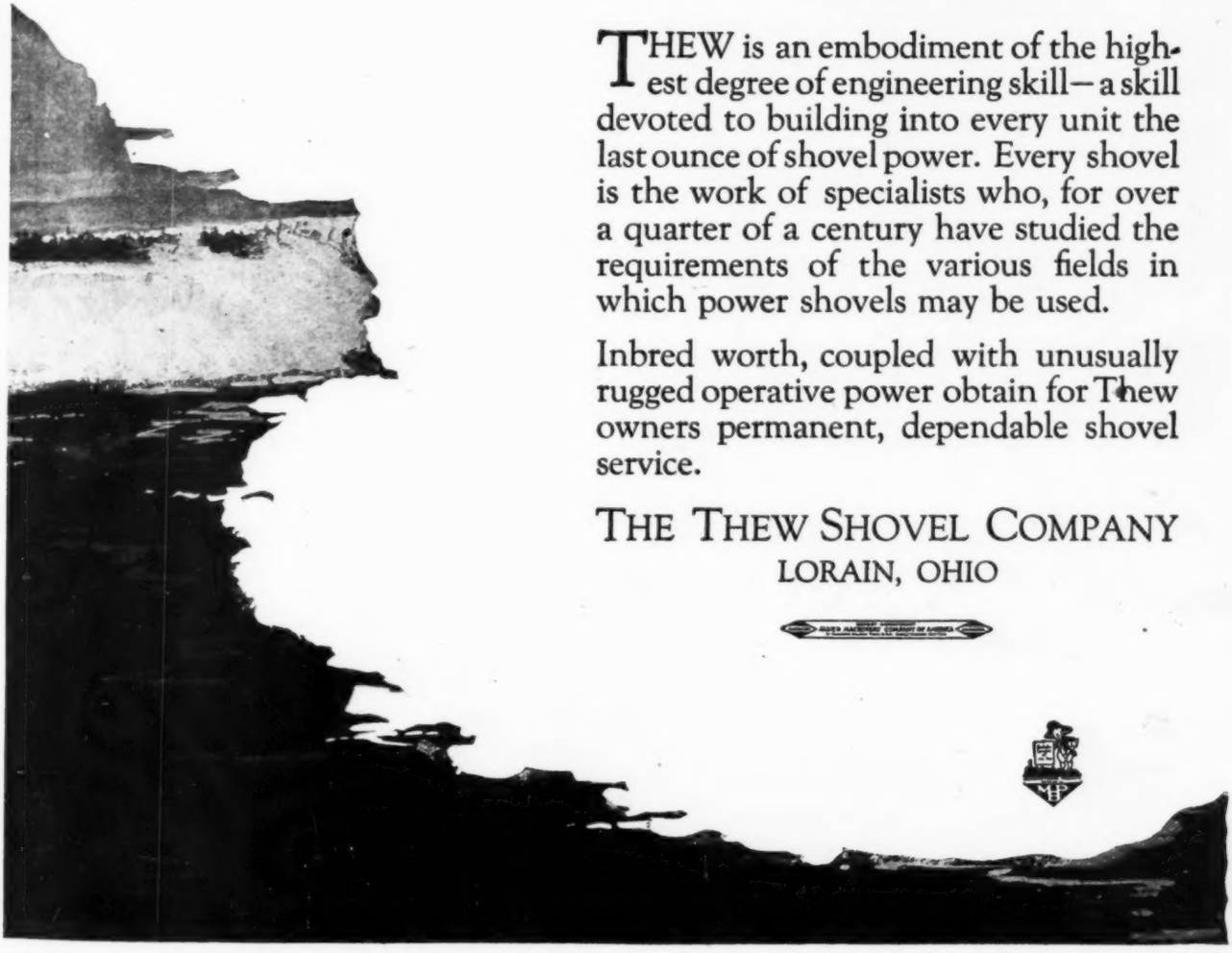
Thew

Power





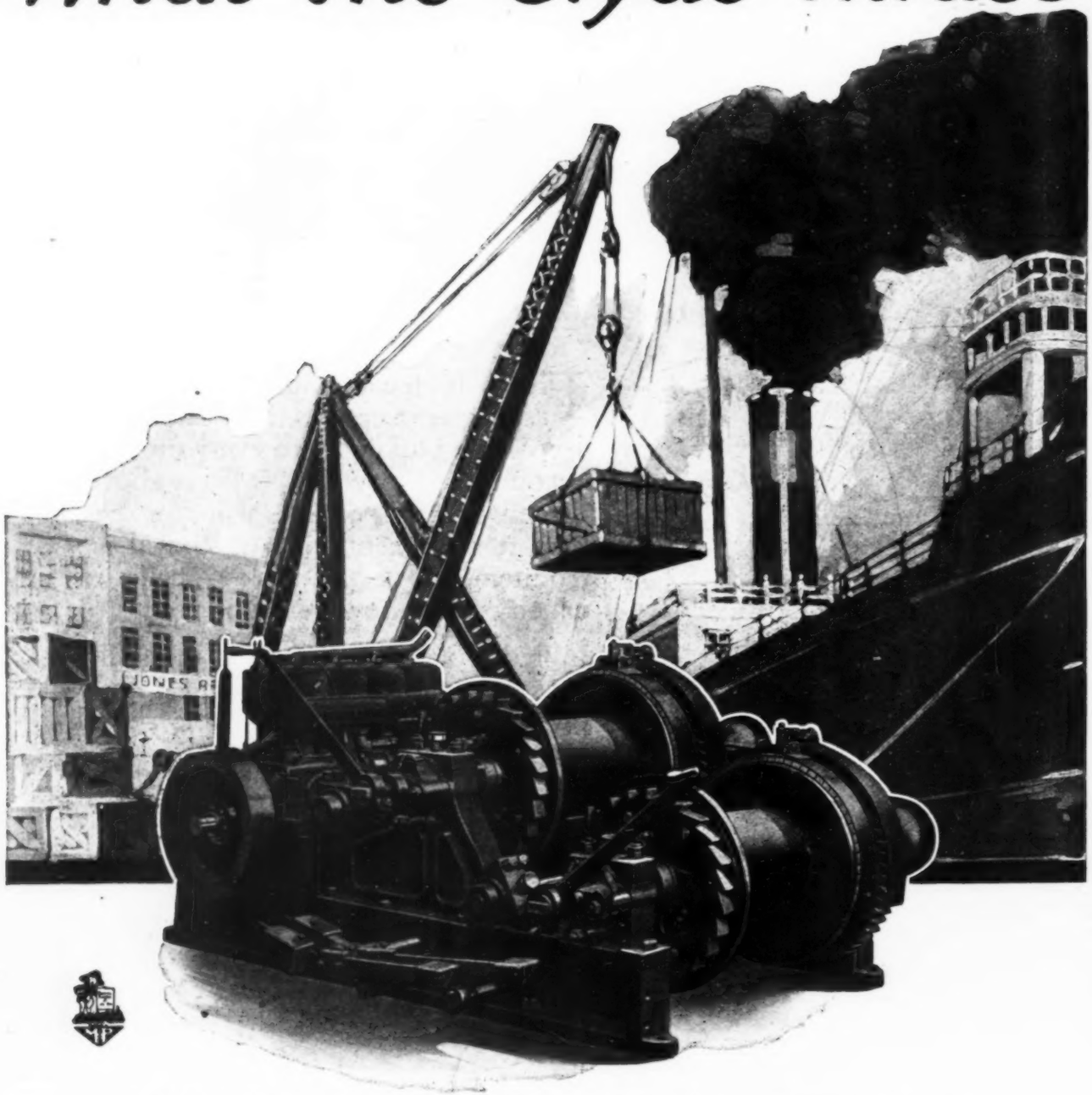
THEW is an embodiment of the highest degree of engineering skill—a skill devoted to building into every unit the last ounce of shovel power. Every shovel is the work of specialists who, for over a quarter of a century have studied the requirements of the various fields in which power shovels may be used.

Inbred worth, coupled with unusually rugged operative power obtain for Thew owners permanent, dependable shovel service.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Power Shovels

What The Clyde Thrust



FOR hoisting jobs—big or little—on docks, in warehouses, on construction work—in fact any place where steam power is not convenient or where electric current is not available, Clyde Gasoline Hoists are the first choice of contractors the world over.

CLYDE

The CLYDE

Representatives In Principal Cities~

Mechanism Means To You

NO part of a Hoist is more important than the Thrust Mechanism, and upon its unfailing and dependable operation depends the service rendered on your jobs.

In this, as all through Clyde design and construction, every care and the experience of years of manufacturing are used with only one aim in mind—namely, to build equipment which will deliver the maximum performance. The Clyde Thrust Mechanism is your insurance against costly delays and repairs.

Note the points listed below

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Duluth, Minn., U. S. A.

Sole Distributors for Clyde Iron Works

Branch Offices and Warehouses:

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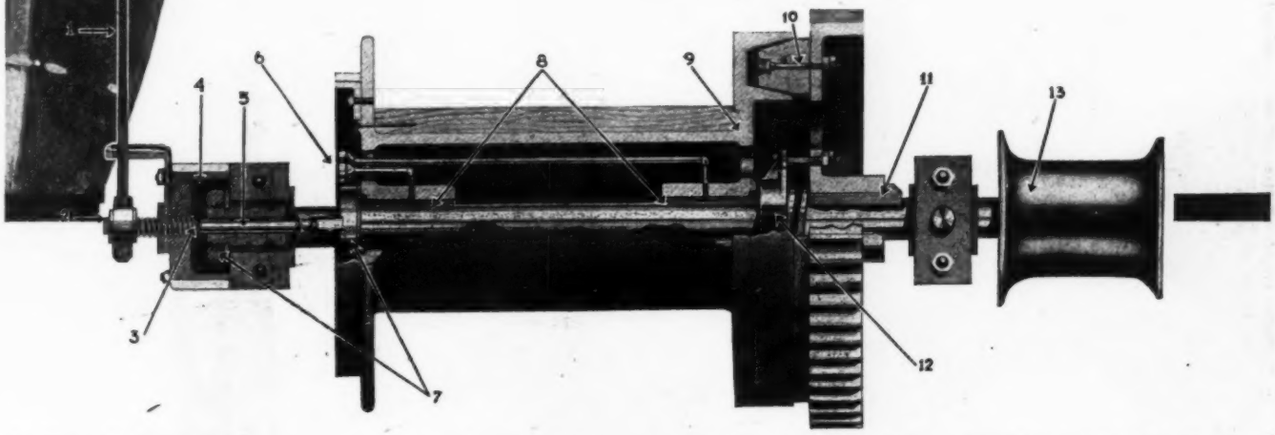
CHICAGO 11 So. LaSalle Street	JACKSONVILLE 507 Hill Building	PORTLAND 18th and Upshur Sts.

ALLIED MACHINERY COMPANY OF AMERICA



1. Forged thrust lever.
2. Large head to avoid slippage.
3. Renewable special bronze point.
4. Oil collar thrust nut.
5. Tool steel pin and cross key.
6. Accessible grease cups for both ends of drum.
7. Bronze liners on larger sizes.
8. Long bronze bushings.
9. Lagging pocket.
10. Smooth turned hard maple friction blocks, grain circumferential.
11. Gear pressed against gib head tapered key to prevent lateral motion.
12. Bridled spring to release drum from friction.
13. Large turned winch head.

LINE

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DERRICK FITTINGS
STEEL DERRICKS
EXCAVATORS
TRACTION CRANES
BLOCKS and SHEAVES
LOGGING MACHINERY

CLYDE

A Clyde Man Will Call Anytime.

STERLING ON A WHEELBARROW MEANS

Sterling Wheelbarrow Company

NEW YORK
BOSTON
CLEVELAND

MILWAUKEE, WIS.

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CHICAGO
ST. LOUIS

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ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

MORE THAN STERLING ON SILVER Sterling

Why Workers Want The Sterling

Your real workers—the "go getters" of your wheelbarrow crew—are discriminating in their selection of a barrow.

They are the fellows who know the whys and wherefores. They are the ones who pick a barrow for the work it does.

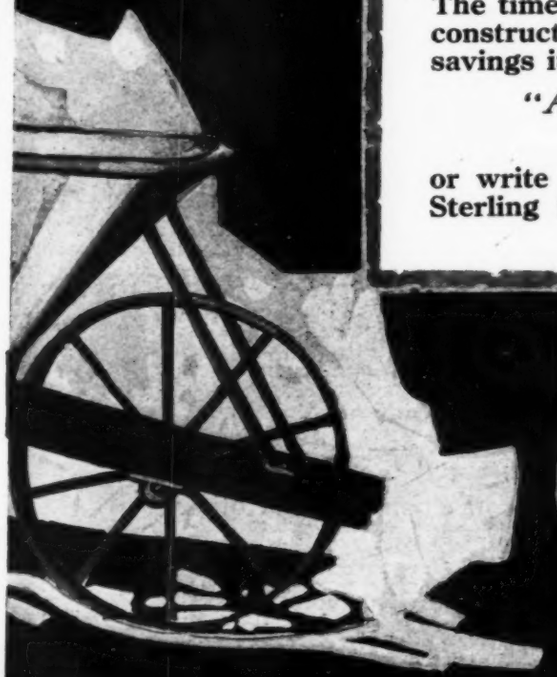
They want Sterlings—want them because for one thing they are at least 50 per cent easier to wheel. One of the six big Sterling features—the self-lubricating bearing accounts for this.

And more, each of the other features makes work easier and adds strength in construction.

The time has come when Sterling quality construction is recognized for the genuine savings it brings.

"Ask the Man Who Pushes One"—

or write to us for the story of the six Sterling features and complete catalog.



Sterling Wheelbarrow Company

NEW YORK BOSTON CLEVELAND MILWAUKEE, WIS. DETROIT CHICAGO ST. LOUIS

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WITCHCRAFT *versus*

If, in the days of Old Salem, a man had claimed that he could load over one cubic yard of bulk material in a minute, in all probability he would have been put in stocks or burned at the stake.

But yesterday's impossibilities are today's realities—we are no longer superstitious.

TAKE the question of material handling as an example of "Modern Magic." With present day methods and machines it is now possible to load ashes, coal, coke, gravel, sand, stone, or similar material at the rate of over one cubic yard per minute—and with only one operator.

Hundreds of B-G Self-Feeding Bucket Loaders are doing this work all over the country—cutting costs and saving time and money.

Write for catalog B or get in touch with the nearest B-G man and learn about the rotary disc feeder, the crawler type of traction, and the other exclusive B-G features.

For all material-handling problems—B-G Belt Conveyors
B-G Self-Feeding Bucket Loaders

Barber-Greene Company
AURORA, ILLINOIS, U. S. A.

BRANCH SERVICE AND SALES OFFICES:

New York, Philadelphia, Norfolk, Worcester, Hartford
Buffalo, Utica, Cleveland
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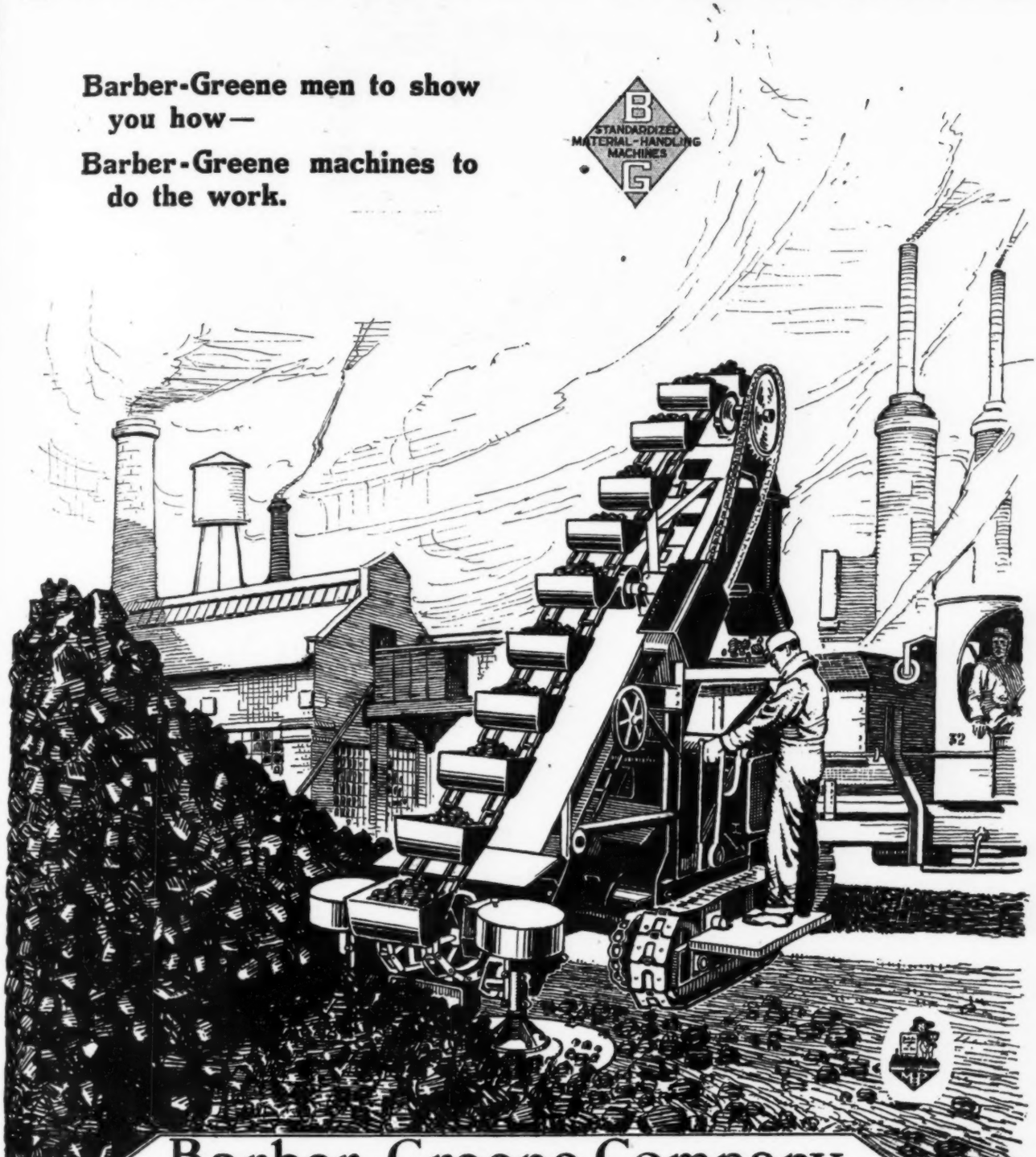
MODERN MAGIC

Barber-Greene men to show you how—

Barber-Greene machines to do the work.



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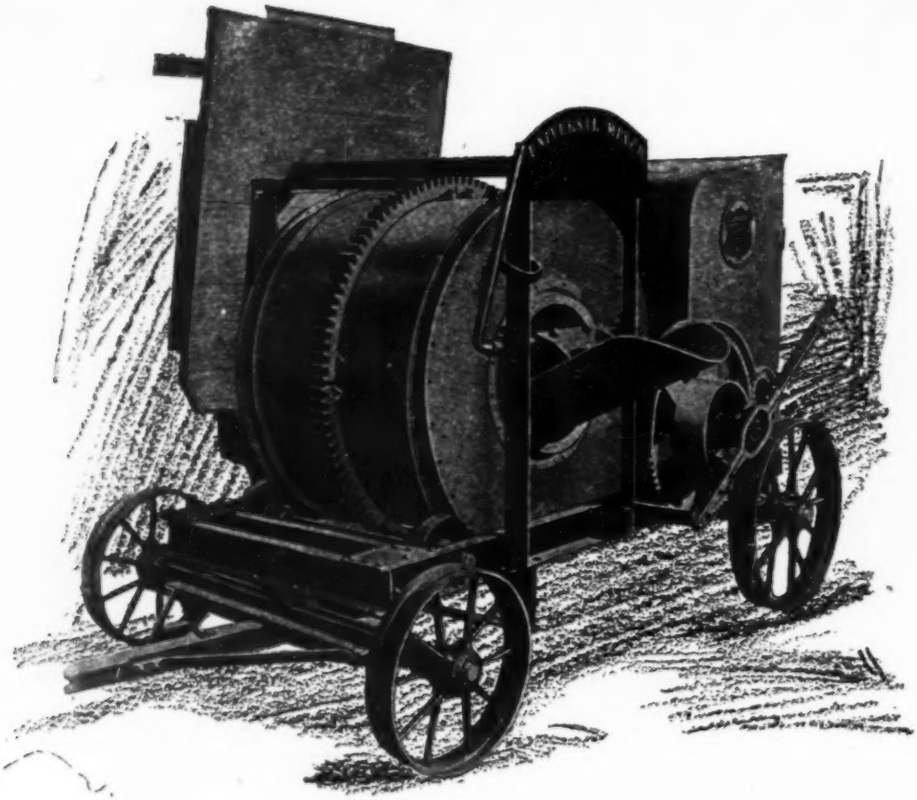

LAKEWOOD Universal Mixer

F. O. B.
Chicago Heights, Ill.

Capacity 7 cu. ft. of Mixed Concrete $733.00

Immediate Delivery

NEW YORK CITY PHILADELPHIA BOSTON DALLAS RICHMOND HOUSTON ATLANTA CHICAGO MILWAUKEE CLEVELAND

LAKEWOOD BUILT TO LAST

Lakewood

THE LAKEWOOD ENGINEERING

LAKEWOOD Mortar Mixer

F.O.B.
Chicago Heights, Ill.

Capacity to Serve
30 to 50 Masons $ 650.00

Immediate Delivery

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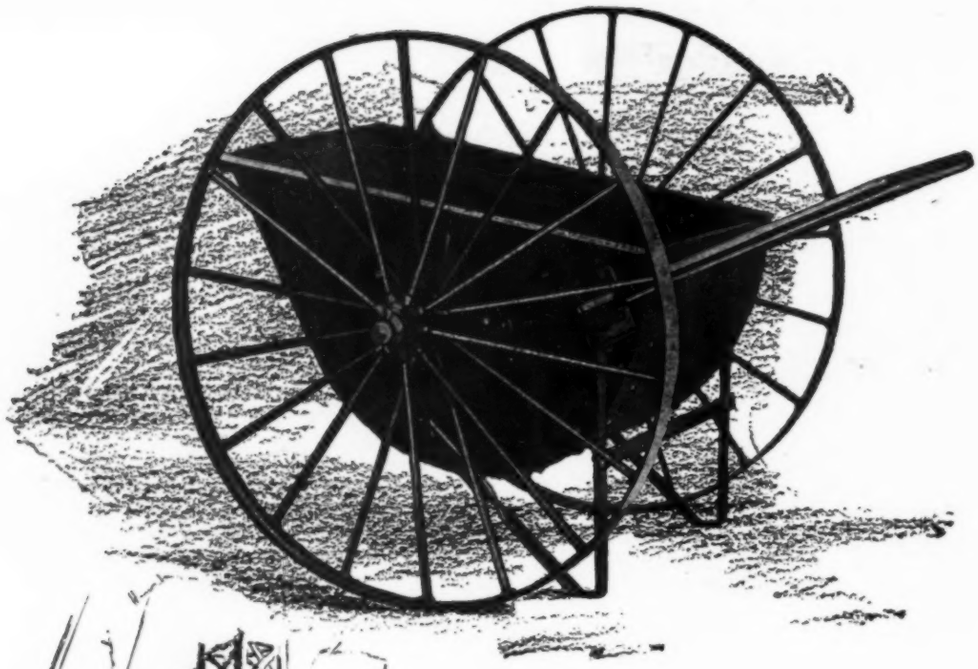
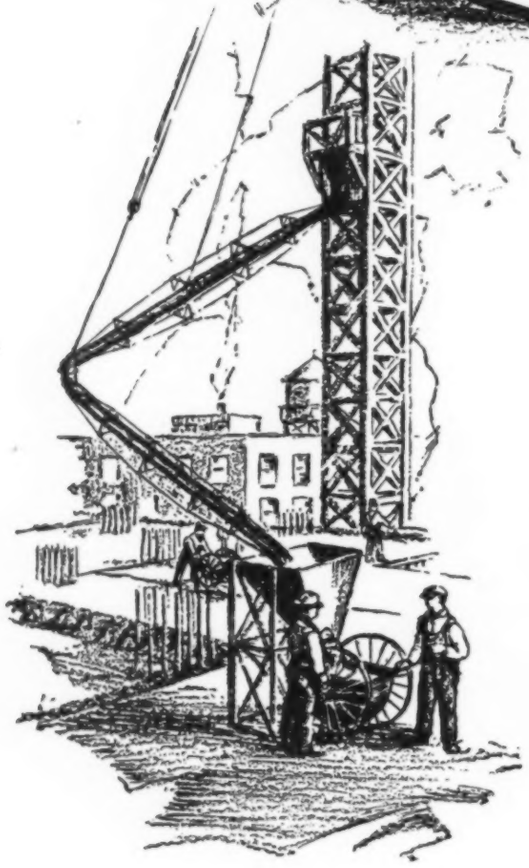
EXPORT-ALLIED MACHINERY CO. OF AMERICA. N.Y. CITY.

Methods and Machines

ALMACOA

COMPANY, CLEVELAND, U. S. A.





LAKEWOOD
Concrete Carts
(Capacity 6 cubic feet)

F. O. B.
Cleveland

With Legs	$ 36.50
Without Legs	34.00

Immediate Delivery

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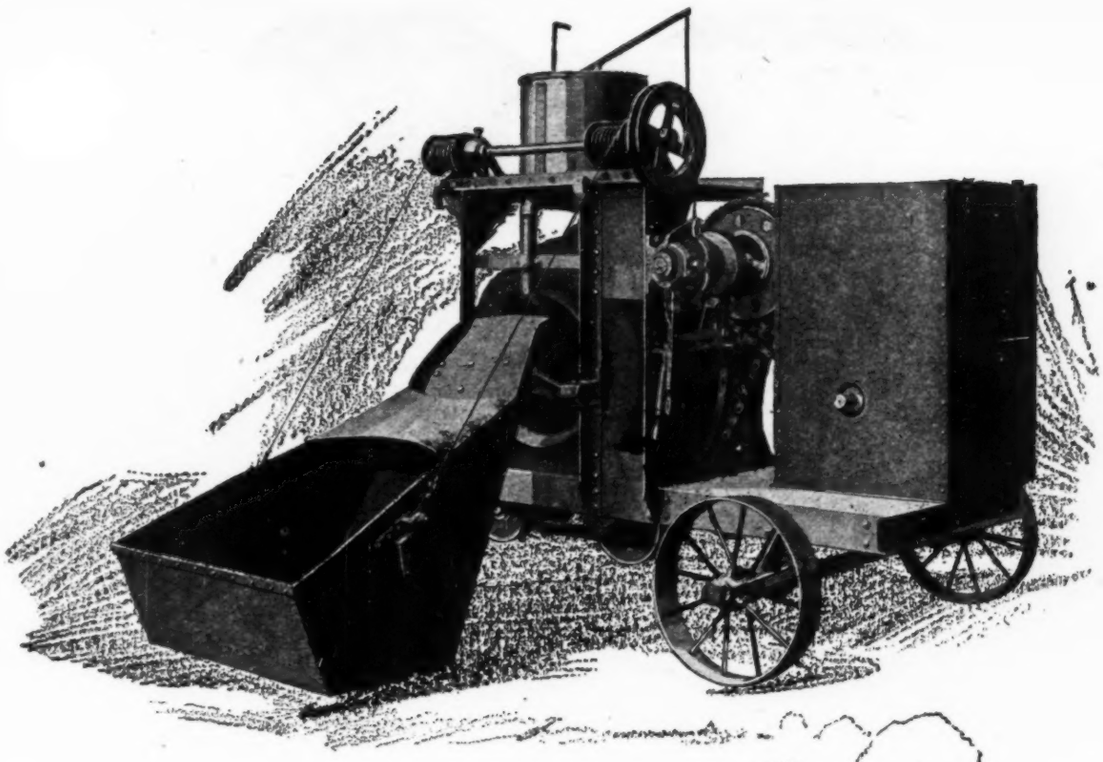
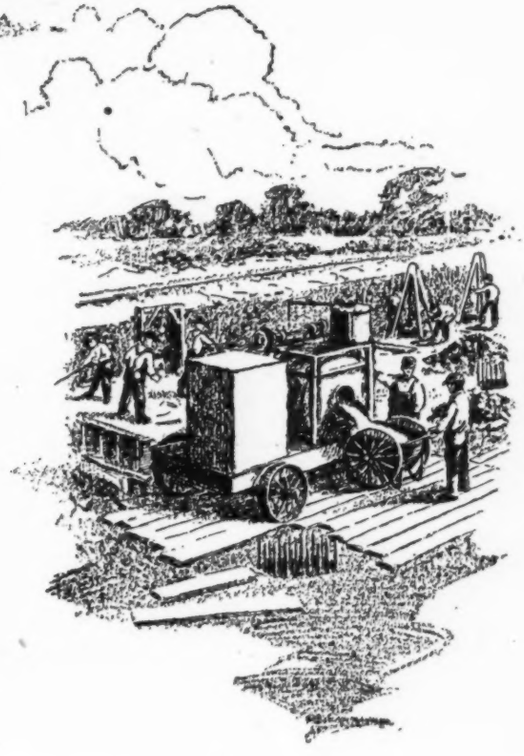
LAKEWOOD BUILT TO LAST

Lakewood

THE LAKEWOOD ENGINEERING



LAKEWOOD-MILWAUKEE 7-S Mixer



F. O. B. Milwaukee

Capacity 7 cu. ft. of Mixed Concrete $ 1335.00

Immediate Delivery

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EXPORT-ALLIED MACHINERY CO. OF AMERICA. N.Y. CITY

Methods and Machines

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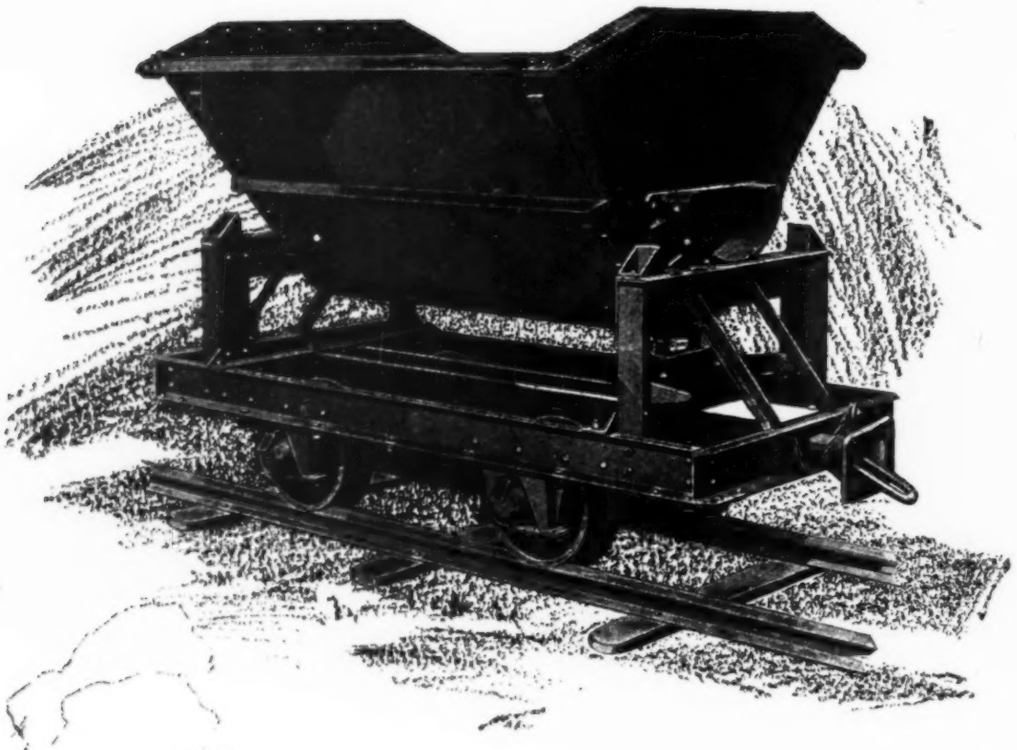
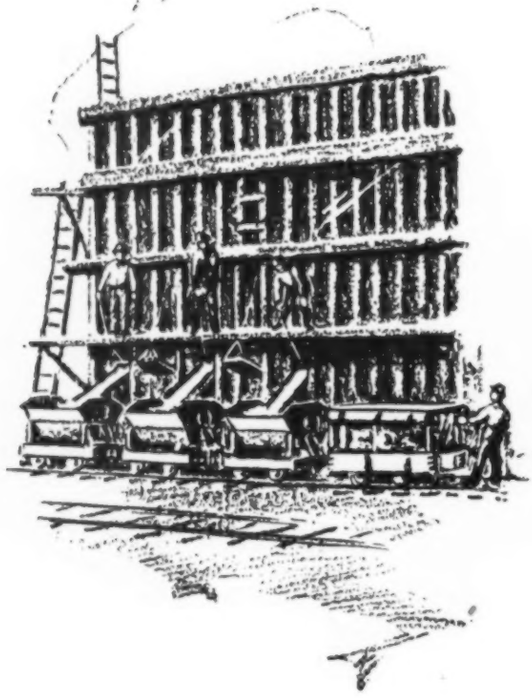
COMPANY, CLEVELAND, U. S. A.





LAKEWOOD V-Dump Car

F. O. B. Cleveland

For Locomotive Haulage, 1½ yd. Capacity $ 250.00

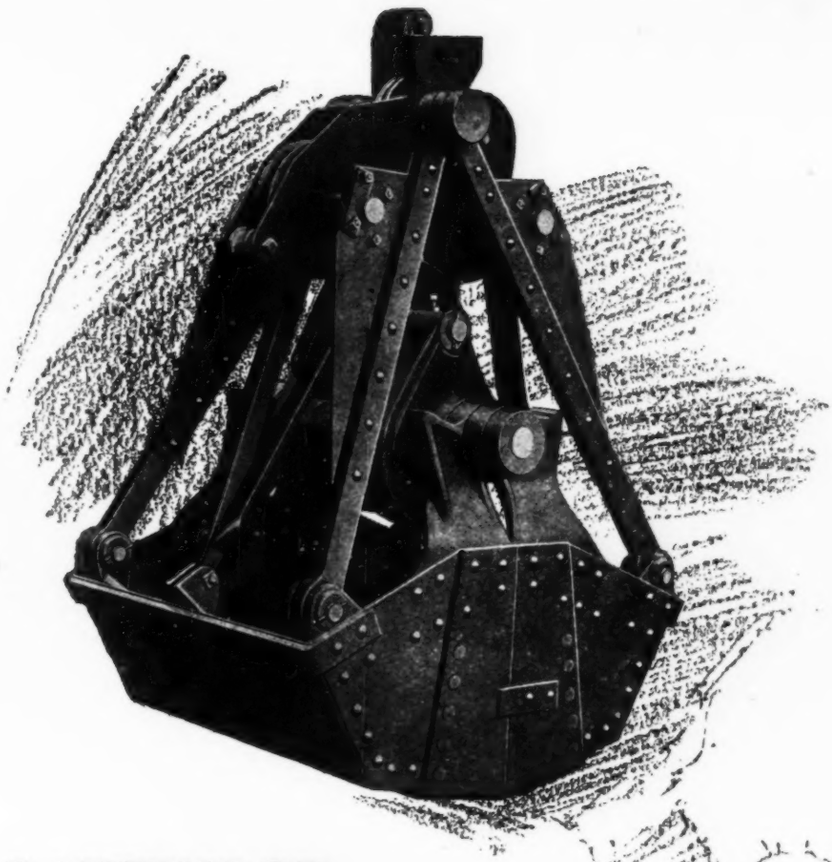
Immediate Delivery

NEW YORK CITY PHILADELPHIA BOSTON DALLAS RICHMOND HOUSTON ATLANTA CHICAGO MILWAUKEE CLEVELAND

LAKEWOOD BUILT TO LAST

Lakewood

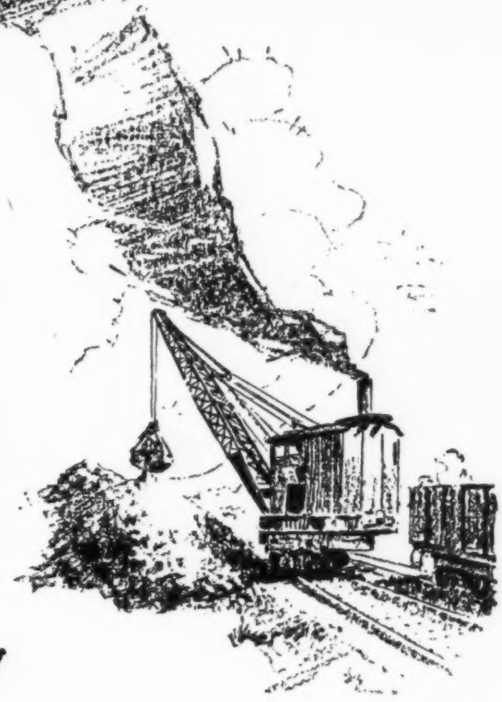
THE LAKEWOOD ENGINEERING



LAKEWOOD
Clam Shell Bucket

Price F.O.B. Cleveland

Capacity	Handler	Digger
½ yd.	$ 660	...
¾ yd.	800	$ 880
1 yd.	950	1040
1½ yd.	1100	1280
2 yd.	....	1400
2½ yd.	....	2020



Immediate Delivery

WRITE THE NEAREST OFFICE

MEMPHIS DETROIT ST. LOUIS INDIANAPOLIS DES MOINES SAN FRANCISCO
BUFFALO SEATTLE PORTLAND MINNEAPOLIS PITTSBURGH LOS ANGELES
KANSAS CITY

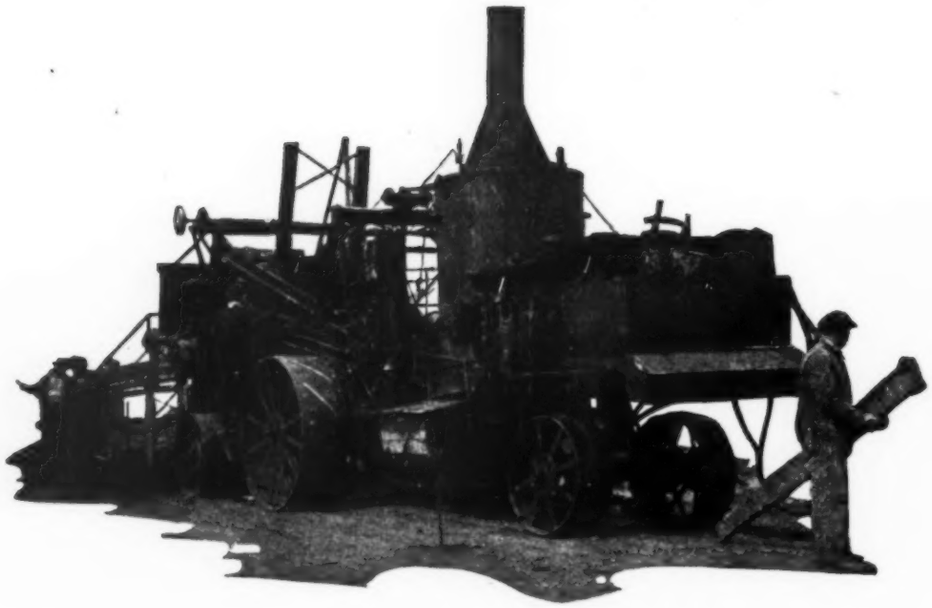
EXPORT-ALLIED MACHINERY CO. OF AMERICA. N.Y. CITY

Methods and Machines

ALMACOA

COMPANY, CLEVELAND, U. S. A.

Parsons Performance



IN 1906, the J. W. Turner Improvement Company of Des Moines, Iowa, purchased their first Parsons Trench Excavator, which is of the "Oscillating" type.

Illustration shows the machine at work cutting sixty lineal feet of trench and excavating fifty-two cubic yards per hour.

This machine has now been in operation for fourteen years and is still owned by the original purchaser.

In 1908 they purchased their second ***Parsons*** of the same type as shown above.

The Parsons Company

NEWTON, IOWA, U.S.A.

NEW YORK, 145 CENTRE ST. EASTERN DISTRICT BRANCH

CHICAGO, 11 SO. LA SALLE ST. CENTRAL DISTRICT BRANCH

LOUISVILLE
MILWAUKEE
DENVER

HOUSTON
SALT LAKE CITY
SAN FRANCISCO

LOS ANGELES
PORTLAND
WINNIPEG

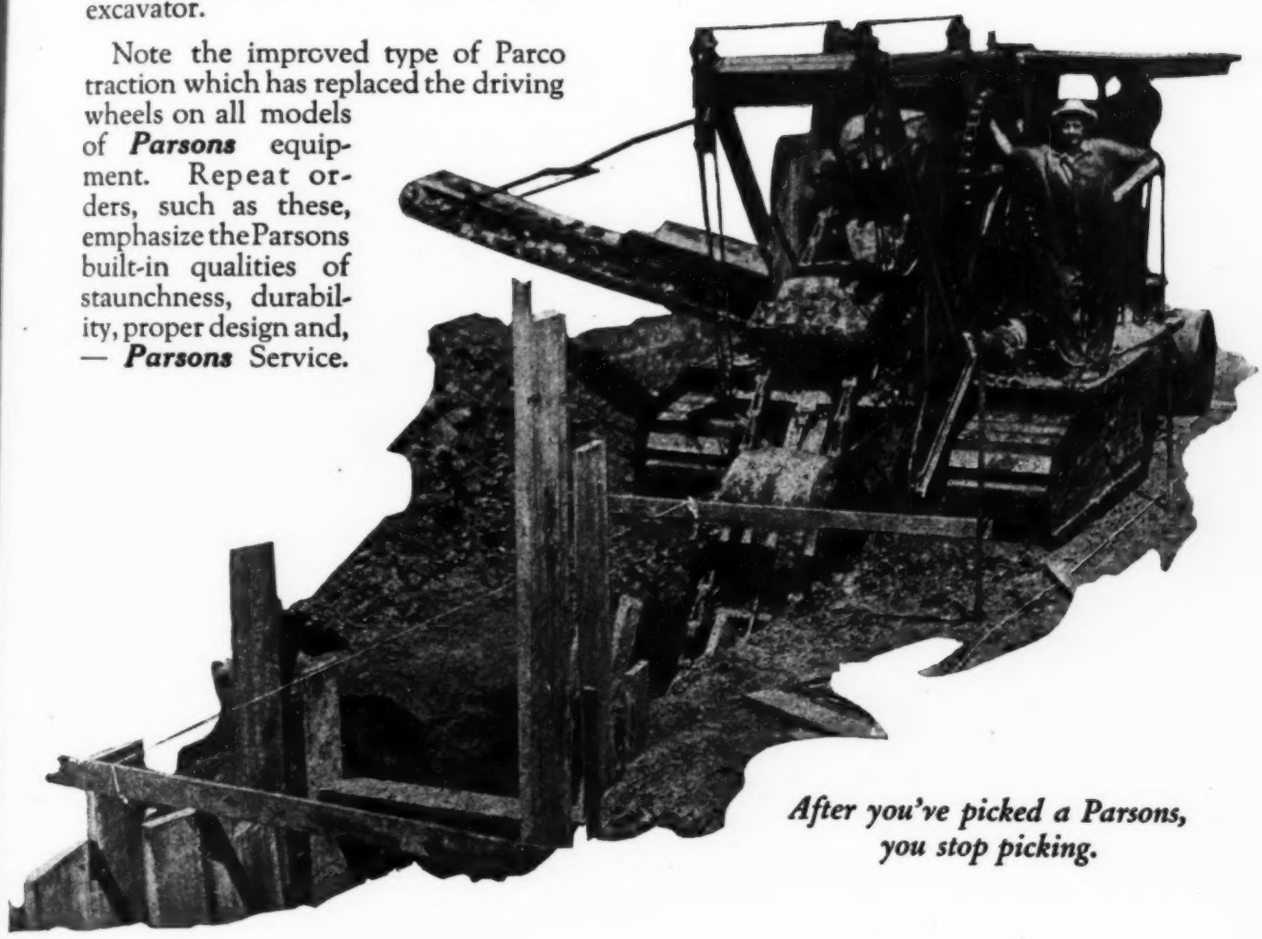
TORONTO
OTTAWA
MONTREAL

EXPORT DEPARTMENT
ALMACO ALLIED MACHINERY COMPANY OF AMERICA ALMACO

Parsons Wins Repeats

IN 1920 they bought a third machine, a Model 36, ***Parsons*** (ladder-type) excavator.

Note the improved type of Parco traction which has replaced the driving wheels on all models of ***Parsons*** equipment. Repeat orders, such as these, emphasize the Parsons built-in qualities of staunchness, durability, proper design and, — ***Parsons*** Service.



After you've picked a Parsons, you stop picking.

We can make immediate shipments on some types of Parsons Equipment.

The Parsons Company

NEWTON, IOWA, U.S.A.

NEW YORK, 145 CENTRE ST. EASTERN DISTRICT BRANCH

CHICAGO, 11 SO. LA SALLE ST. CENTRAL DISTRICT BRANCH

LOUISVILLE
MILWAUKEE
DENVER

HOUSTON
SALT LAKE CITY
SAN FRANCISCO

LOS ANGELES
PORTLAND
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TORONTO
OTTAWA
MONTREAL

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THE Carbic LIGHT

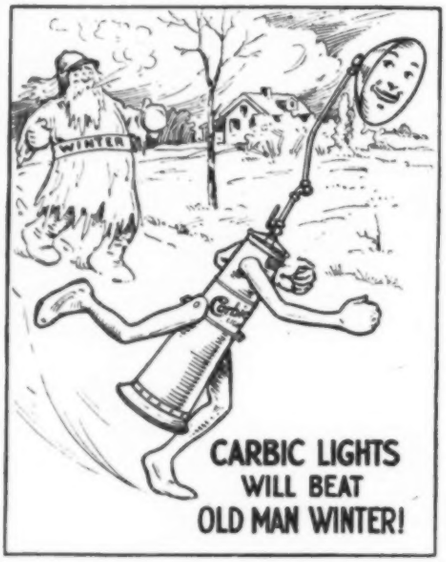
THE Carbic LIGHT

Beware the Short Days and Freezing Weather

Winter will soon be here and put an end to most outside construction work. Even now the days are getting short and frost is in the air.

How about your jobs? Are they all finished or will night shifts and overtime be necessary to beat "Old Man Winter?"

Carbic Lights will lengthen the days, make work possible during dark evenings and all through the night—enabling you to clean up your work ***this season.***



Carbic Lights Use Carbic Cakes

The fuel in handy cake form—Carbic cakes. Cylindrical cakes of highest grade calcium carbide—carried in stock by dealers and distributors in all principal cities. Carbic cakes are convenient, economical, and eliminate the objection always present when loose carbide is used.

Write for detailed information on the Carbic System

Carbic Manufacturing Co.

Duluth, Minnesota

Representatives and Stocks in all Principal Cities

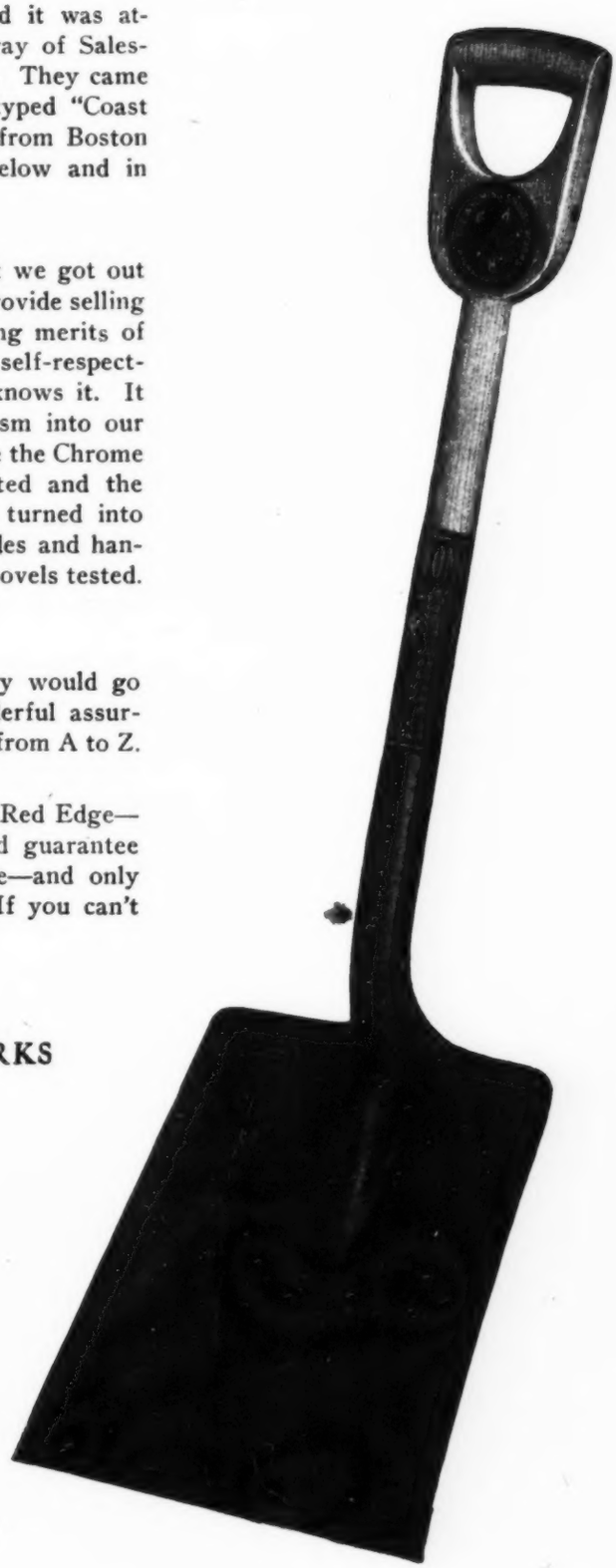
CHICAGO: 111 W. Washington Street
NEW YORK: 141-149 Centre Street
BOSTON: 27 School Street
PHILADELPHIA: 18 S. 7th Street

WE had a Sales Convention in September and it was attended by as intelligent and forceful an array of Salesmen as were ever gathered together in convention. They came from everywhere and to avoid using that stereotyped "Coast to Coast" expression, we will say that they came from Boston and San Francisco and everywhere above and below and in between.

AND what do you suppose was the big thought we got out of it?—Why, that it isn't necessary to try to provide selling arguments for Red Edge Salesmen—the outstanding merits of the Shovels and Scoops are self-evident and every self-respecting and profit-anticipating employer of shovelers knows it. It isn't possible to inject one more drop of enthusiasm into our salesmen—or necessary—but they all did want to see the Chrome Nickel Steel being rolled—formed and heat treated and the Second Growth Northern White Ash Logs being turned into Handles and the XX grade selected. Also the blades and handles being assembled into shovels and the finished shovels tested. All being done under ideal conditions.

THEY saw it all, inside and out, and said they would go back home and "kill 'em dead."—It's a wonderful assurance to salesmen to know that what they sell is real from A to Z.

PEOPLE who buy Shovels should simply specify Red Edge—the shovels with the Manufacturer's name and guarantee back of them and also the distributor's guarantee—and only first-class houses can handle Red Edge Shovels. If you can't get them easily, write us.

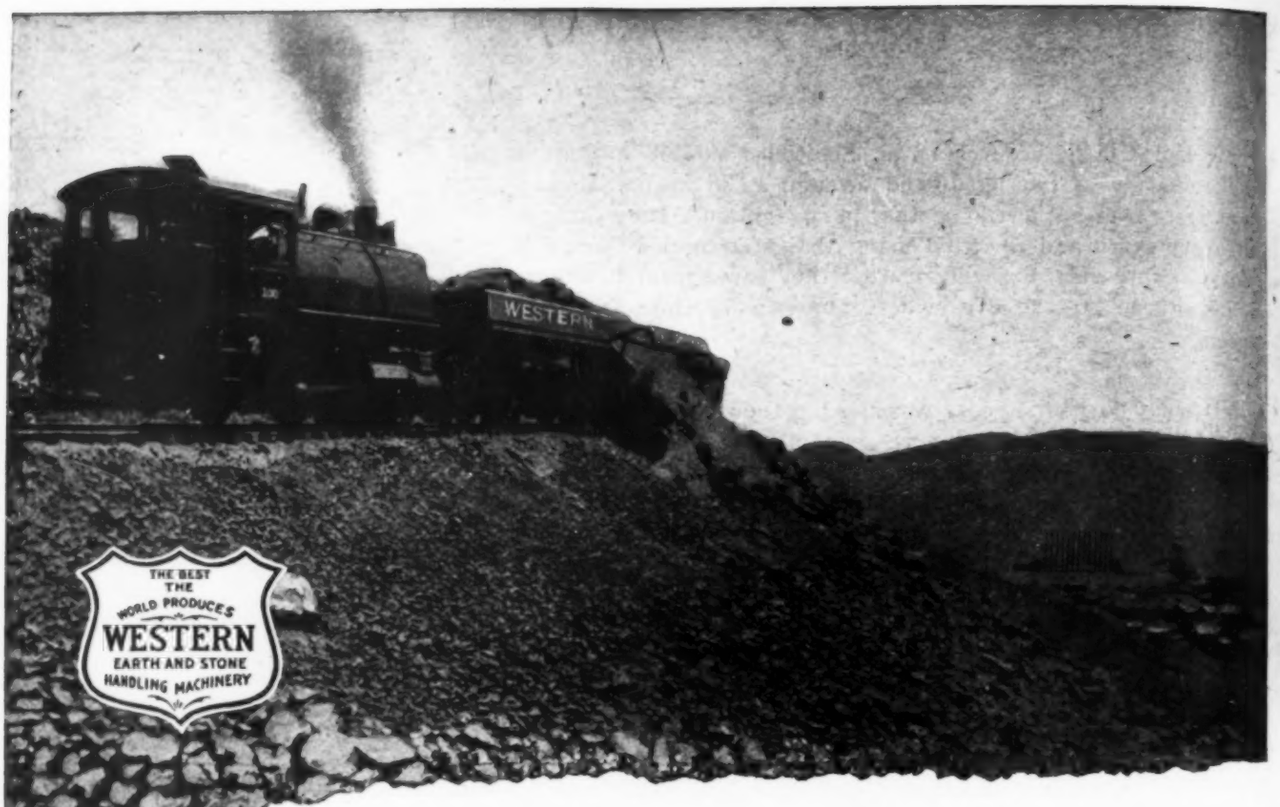


THE WYOMING SHOVEL WORKS

WYOMING, PENNA., U. S. A.

WYOMING RED EDGE SHOVELS

EXPORT REPRESENTATIVE ALLIED MACHINERY COMPANY OF AMERICA



THE BEST THE WORLD PRODUCES
WESTERN
EARTH AND STONE HANDLING MACHINERY

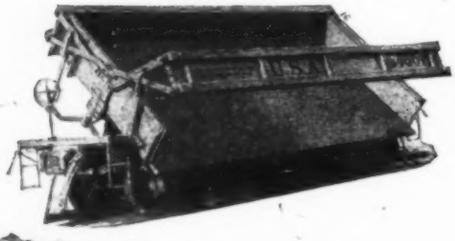
The Western Air Dump Cars

THE Road Commissioners of Crittenden County, Arkansas, have solved the car-shortage problem; they can get all the material they want when they want it.

They bought 72 Western 20-yard Air Dump Cars, and will run them in solid trains from their gravel pits to their sidings and storage places.

These cars will pay for themselves. It has been costing the county forty cents a ton to unload railroad cars (when they could get them to unload).

Own your cars. Buy Westerns
Send for our new Dump Car catalog S-51

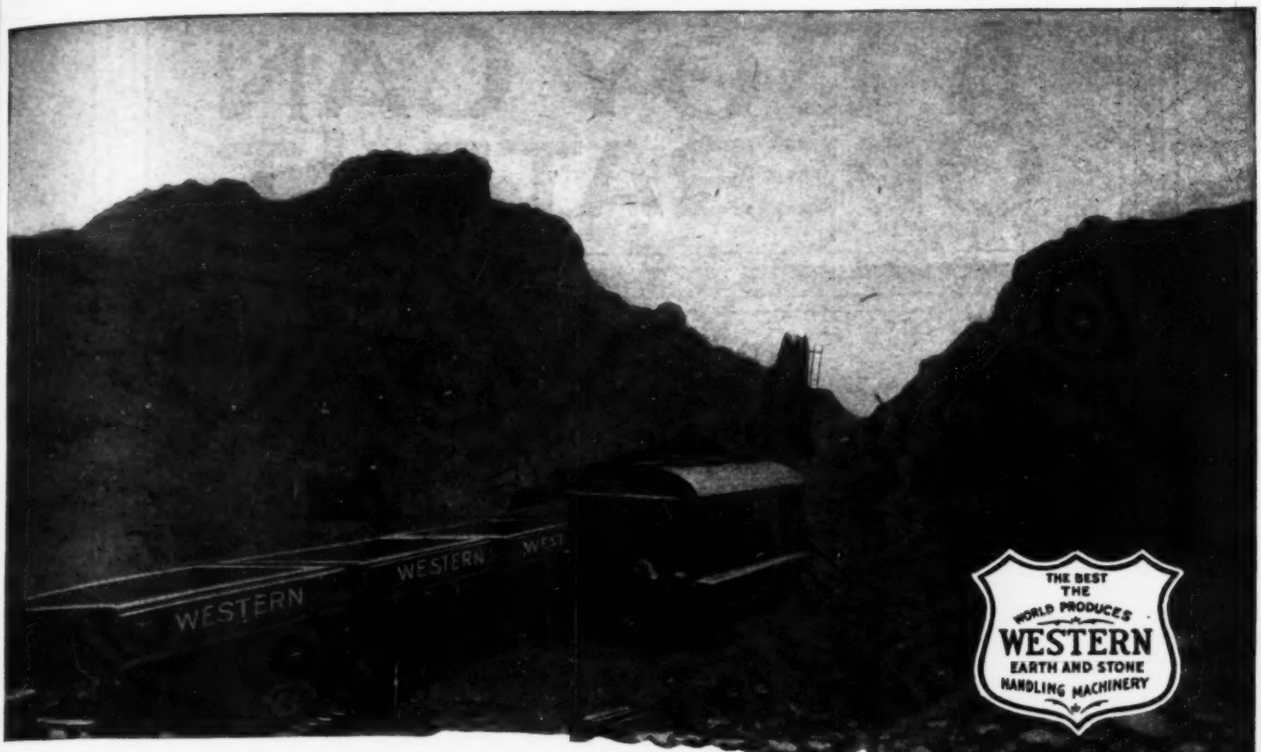


Western Wheeled

Aurora,

MANUFACTURERS PUBLICITY BUREAU Inc. MPB

EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA



Solve Transportation Problems

THE Western cars will dump instantly—at a very trifling cost per ton. The best solution of the problems growing out of the car shortage and the best solution of the problems of industrial plant haulage will be found in Western Air Dump Cars.

They are as well built as railroad cars.

Have M. C. B. construction throughout.

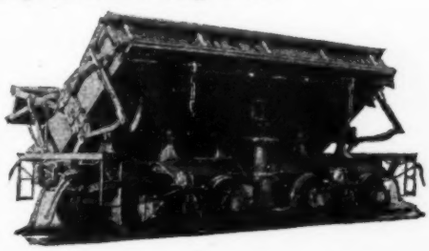
Can travel at high speed with safety.

Dump instantly with trifling cost.

THEY WILL PAY FOR THEMSELVES

Own your cars. Buy Westerns

Send for our new Dump Car catalog S-51



Scraper Company

Ill., U. S. A.

EXPORT DEPARTMENT
ALLIED MACHINERY COMPANY OF AMERICA
ALMACOA ALMACOA

A BOY CAN OPERATE IT

THE picture shows a Western Dump Wagon in action—road grading. On the left it is discharging a yard and a half of dirt, without stopping the team. On the right a companion wagon is returning to the Western Elevating Grader for another load—its bottom doors still open. They will be closed on the way.

Compared with the old-style "stick-wagon" the Western Dump Wagon soon saves its cost.

Compared with other dump wagons, it will outwork them and outlast them—easy on livestock and so simple that a 14-year old boy can drive the team and operate the wagon.

It will dump anything dumpable.

It will stand up under steamshovel or grader.

It will handle either rock or dirt economically.

It is built according to the well-known Western standards—scientific design, first class materials and workmanship.

Send for our new contractor's Equipment Catalog, S-46

Western Wheeled Scraper Company

Earth and Stone Handling Equipment

AURORA, ILLINOIS, U. S. A.

Founded 1877

EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA